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TENTH SESSION

LONDON : 22 JUNE-1 JULY 1925.

GENERAL PROCEEDINGS

3rd Section : WORKING

INAUGURAL MEETING

23 June 1925 (morning).

PROVISIONAL PRESIDENT : Mr. GUSTAV BEHRENS,
MEMBER OF THE PERMANENT COMMISSION OF THE ASSOCIATION.

— The meeting opened at 9.30 a. m.

The President. — Gentlemen, it is now my duty to propose as president Mr. E. du Castel, formerly State councillor, honorary general manager of railways to the French Ministry of Public Works and member of the Permanent Commission. We are well acquainted with the high standing which Mr. du Castel rightly has in the railway world and recognise his untiring energies, and I do not think we can do better than elect him as president of the 3rd section. (*Applause.*)

I also propose, as principal secretary, Mr. J. Van Rijn, a principal engineer of the Belgian State Railways. (*Applause.*)

As there is no opposition, I declare Mr. du Castel and Mr. Van Rijn unanimously elected as president and principal secretary respectively of the 3rd section. (*Renewed applause.*)

I therefore ask these gentlemen to take their places.

(Mr. du Castel then took the chair in place of Mr. Behrens.)

Mr. du Castel (in French). — Gentle-

men, I thank you very much for the honour you have done me in electing me as president of the 3rd section, but in the first place allow me to address my thanks to our provisional president, Mr. Behrens. (*Applause.*)

Yesterday, during the course of the opening ceremony, our eminent colleague's good qualities were referred to by more eloquent speakers than myself. However, allow me to say how glad I am that it has fallen to him to propose me as president of your section. (*Applause.*)

I have the honour to propose, as the four vice-presidents, the following gentlemen :

Mr. Breaud, general manager of the French State Railways;

Mr. Keogh, general manager, Great Southern Railways (Irish Free State);

Mr. Milne, assistant general manager, Great Western Railway (Great Britain);

and Mr. Roberts, general superintendent of transportation, Eastern Region, Pennsylvania Railroad.

(*Applause.*)

Gentlemen, your applause shows me that you approve of these nominations. I therefore declare that these gentlemen are elected. (*Renewed applause.*)

— The section then completed its secretariat and drew up a provisional agenda.

— The meeting terminated at 9.55 a. m.

QUESTION VII.

DISPATCHING OR CONTROL SYSTEMS.

Preliminary documents.

1st report (all countries, except America and the British Empire), by Mr. E. Epinay. (See English edition of the *Bulletin*, March 1925, p. 619, or separate issue [with red cover] No. 24.)

2nd report (British Empire), by Mr. J. H. Follows. (See English edition of the *Bulletin*, February 1925, p. 389, or separate issue [with red cover] No. 19.)

3rd report (America), by Mr. F. P. Patenall. (See English edition of the *Bulletin*, April 1925, p. 1085, or separate issue [with red cover] No. 34.)

Special reporter : Mr. E. Epinay. (See English edition of the *Bulletin*, June 1925, p. 2124.)

DISCUSSION BY THE SECTION

Meeting held on 30 June 1925 (morning).

In the chair : Mr. du CASTEL, president.

— The meeting opened at 9.30 a. m.

The President (in French). — Gentlemen, we have to consider to-day the question of the dispatching system, which is a question of interest for all railways.

I will call upon Mr. Epinay, *Special Reporter*.

Mr. Epinay summarises his special report. This report appears on page 2124 *et seq.* of the June 1925 number of the *Bulletin of the Railway Congress*.

The President (in French). — Gentlemen, before listening to the final summary of the special reporter, upon which we shall have to give our decision, I think it would be useful to have a general discussion on the question of the dispatching system. (*Assent.*)

Mr. Jorissen, Superintendent of the transport service department of the Netherlands Railways, wishes to read to the section a memorandum which he has prepared. This memorandum was written in English, but it has been translated into French. I will have a copy distributed to each member of the section.

Mr. Jorissen, Netherlands Railways, read the following memorandum :

According to my opinion it would have been preferable, if the problem

which is about to be discussed by us, had been announced with the more general designation « Control and regulation of train and traffic working » than with the name of « Dispatching system », this latter being a special American system, which only in rare instances is applied in Europe in more or less the same way as in the United States of America.

The definition as appearing in Mr. Epinay's report, namely, that « it consists of having the movements on a certain section *controlled* by a dispatcher » appears to me to be a slightly incorrect description of the American principle, because the role of the American dispatcher is in general that of a « commander », whilst on most of the French railways the offices of the « regulateurs » and, on English railways, the offices of the « controllers » are to be considered as « inquiry agencies ».

The English control systems may here and there show similarity to the American system, but they did not originate in the United States but are of purely English origin and can therefore hardly be called dispatching systems. Moreover, on many European railway systems the control of and the regulation of the train movements are, either entirely or very nearly so, left in the hands of the stations. When I speak of stations, I mean those points of the railroad where trains begin or end, where trains can cross and overtake other trains. All these stations have telegraph and telephone communication. There is no control whilst the trains are *en route*, but the next day there is a very strict examination of the reports and journals of the guards and the stations by the superintendent of the line and the general superintendent at headquarters. Especially in abnormal circumstances, by heavy traffic, for instance, the service is conducted by the superintendent and his assistants. Traffic working proper is generally speaking in the hands of the superintendent or the central office. It would appear to me that we should not confine our discussions to making comparisons between the control or dispatching systems mentioned in the reports, but that it is no less important to investigate to what extent there is a need for a more or less centralised arrangement than that I have just mentioned and how far such a system is preferable.

We shall not have to lose sight of the causes which have contributed to the systems of France and Belgium.

Therefore allow me to remind you that the introduction of the American dispatching system on the French railways in 1918 was consequent upon the impossibility of the French railway companies carrying out the transport of the American armies according to their own systems of operation, whereby the regulation of the train working was left to the stations.

The American system offered the solution of great difficulties of a peculiar character caused by the magnitude of the traffic which demanded such an increase of staff as was impossible to cope with.

Even after the war lack of experience of innumerable members of the staff caused the French railways to adhere to that system of dispatching.

Already before the war the Belgian railways had come to the conclusion that the great development of the traffic necessitated a more concentrated regulation of traffic working.

In May 1914, the Belgian State Railways had already decided to establish « traffic regulating offices » after the style of similar German institutions which they had studied in Cologne.

After the war the application of the German systems was abandoned and the American system was decided upon.

The Belgian railways had also to deal with a great shortage of personnel and it goes without saying that here, as in France, the number of skilled employees

fit to regulate the traffic working was very much curtailed. Great attraction, therefore, was possessed by the application of a system where the control and the regulating were not carried out by a station but were entrusted to a limited number of « regulators », controlling sections of some hundreds of miles.

This course was, moreover, emphasised by all sorts of difficulties in the operation of the railways which cropped up after the war.

These difficulties, which disorganised the service, called for special measures, whilst the introduction of the eight-hour working day necessitated the employment of a great number of unskilled employees.

On the English railways, where previous to the war various systems were in use to a limited extent, whereby the control and regulating of traffic working were more centralised than on the continent, similar circumstances led to an extension of these systems.

When judging, therefore, the value of the French and Belgian dispatching system, it is essential to take into consideration that the introduction of these systems must be looked upon as an emergency measure.

Whilst the American system was not unknown in Europe previous to the war, it is problematical whether, if there had been no war, some railways would ever have resorted to the complete American system (to the dispatching « integral ») or something similar.

It must be borne in mind that conditions in America differ greatly from those in Europe. The distances separating the stations are frequently enormous, the number of trains on single-track sections is often very great, and the overdues on these sections cause a change in the crossing points, an operation which is rendered more delicate by the existing side tracks (*voies de garage*) provided at various points beyond the stations. On the other hand, Europe possesses more double and quadruple tracks, with the consequent advantage that a delay can often be easily remedied by a simple change in the regular order of succession, an overdue train easily allowing itself to be passed by other faster trains.

It is, however, conceivable that the Belgian railways, which already before the war aimed at a greater concentration of operation were more inclined to adopt the American system in preference to the German system.

It must be pointed out that the operation of the German railways in many respects differs considerably from the system introduced on the French, Belgian and English railways.

On the stations of the German railways the regulation of the train service and shunting operations on the main lines is strongly concentrated.

Every station possesses one specially appointed employee called « Fahrdienstleiter », to whom is entrusted the entire regulation of the train movements in the whole station. The signalling installation of the stations in Germany therefore differs from the French, Belgian and English plan.

A similar centralisation of the service on the stations is unknown in Belgium, France and England, where all arrangements are chiefly settled between the various signalmen, who possess a great measure of authority.

It is to this important point of difference, Mr. President, that I wish to draw special attention, not only to compare the one system with the other but because an investigation which I made in 1923 in various countries, concerning the dispatching system and some other control systems, convinced me that a greater centralisation of the service in the stations would give a more perfect arrangement with the dispatching system and with the English systems, and this also causes me to think that it

becomes less urgent to resort to dispatching.

I wish to emphasise, however, at once that I fully admit that under special circumstances, on sections with a very heavy goods traffic of changing proportions, the introduction of some dispatching or control system is necessary.

As is known, the Germans have also reverted to this course and have established « Zugleitungsstellen » (control offices ») which are either in operation during the whole year or in operation only during part of the year. But the centralisation of the service in the stations calls much less for the introduction of a dispatching system, whilst on sections where dispatching (controlling) is introduced the centralisation in the stations leads to better results.

Before deciding on the introduction of the American dispatching system or some other system on the same basis, and thereby handing over the operations of the service to a dispatcher or controller, it is well to consider thoroughly what it means to relieve the station master or his assistants of the management of the service.

I do not hesitate to say that, even apart from all other work with which this dispatcher is burdened, such as the planning of special and auxiliary trains, it seems to me to be an impossibility that the operation of the service in stations of importance on the railways of Western and Central Europe should be left to the care of the dispatcher or even that he should be allowed to exercise any important influence.

It is impossible that the dispatcher can be informed in good time of all train and shunting operations taking place at all the stations under his command, or indeed that he realises the unity of command by grasping the measures to be taken by all the distant stations on his section.

Mr. Epinay in his report also raises these difficulties. To the question : why, except on the Belgian and the French State railways, the controller has not been invested with complete powers, he answers : there are two reasons. The technical reason is that it is already sufficiently difficult for the « regulator » to follow the situation in the large stations whose capacity is not always sufficient; an overcrowding of traffic inevitably results in the obstruction of traffic all along the line, and for this reason it is not always practicable to place the entire dispatching and receiving of trains in the hands of one official, who may have only an imperfect knowledge of the complicated operations involved.

One of the two administrative reasons is: as the « regulator » is of a lower grade than the chief officials in large stations and depots, it would be difficult for him to give them orders, especially in cases where there is divergence of opinion.

If our objections are admitted, it follows that the use of the dispatcher is to a large degree restricted; not only is he unable to do anything in particular on those sections of the railway where the most important and numerous disarrangements are likely to be created, but through this curtailment of his powers circumstances continuously crop up to cause a failure of his calculations.

According to my opinion it is therefore clearly understandable why some French railways stop at giving the office of the dispatcher the value of an « inquiry agency », and it must be admitted that such institutions as the English control systems may prove serviceable. But even under these circumstances there exist dangers. On the one hand, there is the danger that the influence of the dispatcher increases beyond the intention. Mr. Epinay states : Whether the controller be an official whose orders must be obeyed, or an adviser whose advice may in theory be disregarded, if circumstances justify this, it is always

he in practice who regulates the movements of the trains.

On the other hand there is the danger that his task becomes of so little interest that his ambition declines. It would appear to me that these dangers, which do not soon become apparent, must not be underrated.

That even in America the before-mentioned difficulties are felt as can best be illustrated by quoting the American Dalby, who has written a booklet which I can recommend should be read. It is entitled : *Train Rules and Train Dispatching.* In his « Words to Operators » Dalby draws attention to the important task of the « operators ».

By « operators » he does not mean the « opérateurs » of the French and Belgian railways, who are really assistants to the dispatchers and who are working in the office of the dispatcher, but he means the employees of the stations and the road, whose duty it is to give the necessary information to the dispatcher.

Dalby says amongst other things : « I regret that the importance of their task is not realised by all operators and that they often forget that they are in reality the eyes and ears of the dispatcher. »

« The eyes and ears of the dispatcher », Mr. President, therefore not blind officials, as they were called by the American officers, as mentioned in the report of Mr. Epinay.

Dalby says further : « All the knowledge that the dispatcher has of the location of trains he gets from the operator. One thing in which I have found much neglect is in keeping the correct time and making correct reports of passing trains. The operator who says that the train will be ready in five minutes, whilst in fact the train can only leave after twenty minutes, comes in for his share of criticism. The traffic working depends entirely on the reports of the various stations and it is difficult to emphasise sufficiently the importance of this task. The operator should realise that he is a very important part in the train dispatching department, and that, while the dispatcher is in fact the man who actually directs the movement of the trains, yet his orders are issued on the information obtained from the operator as to the conditions surrounding the trains affected. The dispatcher acknowledges in a large degree his dependence on the operator. »

Our objection to the dispatching system as carried out on some of the European railways is hereby fully borne out.

Where the leading of the service cannot be efficiently entrusted to one official and whilst the dispatcher and the operator are not sufficiently aware of each other's work, it is hardly possible to expect good results even by the best of co-operation.

There is also a great danger that the operator's (station master's) ambition declines and that his initiative is blunted. If, moreover, he is not conversent with the work of the dispatcher and if he has no idea of the possible importance attached to his communications, he may not infrequently omit these communications altogether.

If, however, there are efficient officials in the stations, then they are only occasionally required elsewhere than at the stations.

On the Netherlands' railways, where the service of the stations has been centralised in the same way as in Germany, Italy and Austria, the most intelligent officials are picked out of a well schooled staff for directing the service in the stations. Their rank is dependent on the importance of the stations to which they have been appointed; at the smaller station the work is generally done by the station master or his deputy; at the larger station he takes charge as soon as exceptional circumstances demand it; even at the most important stations he must be able under the most difficult circumstances to take entire charge.

These leaders of the service are there-

fore anything but blind. On the contrary, they are possessed of good physical and mental eyes, and their point of vantage has been so selected that, so far as possible, they are able to watch what is happening at the most important point. Is it not advisable to consider twice before replacing them by people who may be more or less « clairvoyant » but who do not see anything of what is happening ?

Modifications in the order of succession of trains, such as change of crossings and overtaking of other trains (not only those taking place at the next stations but also those taking place at stations beyond the next) can be fully entrusted to our station dispatchers. Errors are extremely rare. In case of incident or accident, or if it should be necessary to revert to the single track, they are quite capable of diverting trains to other routes or taking such different measures as the situation may require.

Moreover, an advantage of this system is that these station officials, in so far as the regulating of the traffic working is not their exclusive job, can be allotted other work in the stations. They can also render platform service or take charge of the shunting. It would appear to me that on some sections where the dispatching system has been introduced it will frequently occur that the dispatcher could easily be dispensed with, whilst carrying out some unnecessary or superfluous work, in any case when he could do more useful work.

Lack of sufficient schooled personnel explains the inclination which some colonies of the European countries have shown towards the dispatching system. At Java, the most important island of our East India colonies, one of the railway companies is applying the system.

But on such railways one must not lose sight of the importance of well trained station personnel, not only because they can be used for dealing with the train service but also because they can be put to all sorts of other work. From what I have said it follows that centralisation of the service on the stations has very great advantages, not only because this system tends to dispense with the introduction of dispatching with its adhering disadvantages but also because the system of dispatching proves its true value on those sections where it is indispensable. In consequence the task of the dispatcher will be relieved to the highest degree. He receives his information from the stations from one single man who has everything in hand, and without whose will the orders and counsels of the dispatcher cannot be disobeyed.

In the main the task of a dispatcher (controller) is of a dual nature. In the first place he has been appointed to control the movement of the trains during the time that they are *en route*, whilst in the second place it is his duy to plan the running of trains not provided for in the time-table.

After what I have said, you will not be surprised when I advance as my opinion that introduction of some dispatching or control system is not required for the regulation of the control working of the regular trains.

By « regular trains » I mean trains which run every day during a whole season at a fixed time. Certainly an inquiry office may be of great value, but it seems to me that one would never take into serious consideration the creation of such an office solely for these trains.

If, however, the goods traffic is of such a nature and of such dimensions that occasionally the need is created for more trains than are provided for in the service time-table, then the need for a central regulating machinery may be felt.

Notwithstanding, it is my opinion that the best arrangement is obtained if it is settled as much as possible in advance to what extent under special circumstances a need for these additional trains may crop up and which would be

the most advantageous timing. This is not so simple as it looks.

Both for the senders and for the consignees of goods it is often of very great importance to know at what hour the goods are to be dispatched after they arrive at the station.

It is further necessary when planning the time-table to keep an eye on the connections with other trains and also to consider the fact that some stations have not too much room.

It is further essential to minimise the number of locomotives as far as possible and to plan a service as advantageous as possible to the engine-power as well as to the other train-personnel.

This therefore is not a job that can be efficiently carried out in a few minutes; the work is still more complicated if the train journeys are long.

It is, of course, also necessary that the safety of the traffic should be kept in view.

Also in this case it ought to be the rule that nothing should be allowed to be postponed that can be considered and settled before the available time has become so short that things can no longer be thoroughly arranged. Also in the Netherlands we are confronted by periods of extraordinarily heavy traffic. We have, for example, to deal with seasonal traffic, the scheduling of time-tables for the traffic of vegetables, potatoes, fruit, beetroot, fish, and so on. But before this traffic is expected conferences with the most important shippers take place, in order to get some idea of when and how many auxiliary trains will be required; this serves the interests of both commerce and railway undertaking alike.

. From this it follows that the plotting of « auxiliary trains » that is, trains whose journey is fixed in advance but which are only run by special instructions on the days when they are needed is preferable to the introduction of special trains (trains whose journey is not fixed in advance but is decided according to the particular circumstances of the case), and at the same time, the planning of these trains is an occupation that should only be left to dispatchers and station masters when it is not possible to arrange otherwise.

In this connection I should like to draw attention to the great value of timing trains by diagrams. Mr. Follows has very properly pointed out that this method is essential as the groundwork for a successful control system. Whilst on most Continental railways this system has existed many years, on English railways there is made a very spare use of it; I think this has been a disadvantage.

Especially the timing of special trains is bound to be a very difficult and time-robbing occupation if this is carried out with the aid of time-tables. It may be advanced that this is entirely a matter of habit, but I fail to agree.

The introduction of the train diagrams on the Midland Railway has caused an important improvement of the service on that railway.

The question crops up whether, if on certain European railways the application of train diagrams would enable the stations to carry out their own making up of special trains, the need of centralisation would not be felt in a less degree.

The station masters and their assistants on the Dutch railways understand properly the use of diagrams. They are not appointed until they have given proof that they can use them for the change of crossings and overtakings and the making up of special trains.

They are under obligation to hand in each case a copy of the time-table of the special train to the driver and the chief guard. It is clear that under such circumstances the need of a dispatcher or a controller is hardly felt.

The need of a dispatcher (controller) may, however, become apparent on railways with a heavier goods traffic than that carried by the Dutch railways; even

when our numerous rivers and canals are frostbound, or when the goods traffic, on account of our important « seasonal traffics », calls for every abnormal measures, we are able to cope with these conditions without the aid of dispatchers.

Our increasing goods traffic during the last years has, however, created a need for greater centralisation.

Radiating from headquarters in Utrecht we have built special telephone lines connecting our central train working departments with the superintendent of the line and some of the more important goods depots, whilst the offices of the superintendent of the line possess direct telephonic communication with all goods stations of any importance.

If necessary, daily conferences take place at fixed times with the superintendents of the line, who are thereby obliged to keep in personal touch with everything taking place on their lines.

In this respect we fully agree with the opinion of some English railways, which also leave the main management of the service in the hands of their central office.

According to our opinion, the dispatching system gives too much power to the dispatcher, whilst insufficient control may be exercised over his work.

With regard to the question whether the dispatching or some other control system has technical or financial advantages as compared with a previously applied system leaving the regulation of train working either entirely or mainly in the hands of the stations, I beg to submit that the answer is far from simple, because a proper comparison is only possible when it is definitely established that a previously applied system was in all respects as perfect as possible, that is, that the management of the service in the stations was entrusted to the most able hands and the best means were applied to exercise control.

It may be observed that from the report of Mr. Patenall it is apparent that in America the dispatching system is the only system applied there.

Mr. Lamalle, Belgian State Railways (in French). — Mr. President, I have just read with great interest the memorandum prepared by the Dutch delegate. I am ready to admit that the dispatching system may not be necessary in Holland : the utility of this system depends essentially upon the density of traffic.

In Holland the waterways have been highly developed. In Belgium, on the other hand, the railway system has reached a higher state of development. I do not know the exact amount of commercial traffic carried by the Dutch railways, but on the Belgian system the annual tonnage carried amounts to 72 million tons over 2 920 miles of railway. I think, therefore, it may safely be said that if we had not adopted the dispatching system, we should have been unable to cope with present day demands on our railways.

In Belgium the dispatching system was not adopted as a result of the war. As Mr. Jorissen has pointed out, prior to 1914 we had studied the German system, and we intended to introduce a similar system. After the war, however, when we had become familiar with the system in force on the French railways, we had no hesitation in deciding in favour of this system.

In Germany the dispatching system was only of an intermittent nature, and the dispatcher had no diagram of the actual running of trains, which in my opinion is essential.

The main objection which Mr. Jorissen makes to the dispatching system is that it tends to destroy initiative on the

part of station masters. We were apprehensive on this point at the beginning, but experience has shown that there are no grounds for such apprehension. The dispatching system has given unity of control between station masters, but the dispatcher does not intervene as regards movement inside the large stations : his main duties are in connection with trains running on the line. In order, however, to establish close collaboration between the dispatcher and station masters we have regulations which require the dispatcher to travel over the lines several times a month to visit the different station masters. We have considered this absolutely essential. On the other hand, we invite station masters to visit the dispatching offices, so that they may understand the important nature of the duties performed by the dispatcher.

Finally, when a dispatcher has carried out his duties for a certain period, we transfer him to a station and select a station master to take over his dispatching duties. It can, therefore, be said that these officials are interchangeable.

Further, in the larger stations we have introduced what we call a local dispatching centre, and recently, when I had occasion to visit the station at Dunkirk, I noticed that our French colleagues had introduced a local dispatching system absolutely identical with that in operation in our large marshalling yard at Schaerbeek, near to Brussels.

I consider that the dispatching system constitutes a veritable means of education in train control for station masters.

I can only express the hope that the Dutch railways will at an early date be led to adopt the dispatching system. That will mean that they have a very dense traffic to handle, and that is what I wish them. (*Applause.*)

Mr. Payet, French State Railways (in French). — Gentlemen, I cannot pass over without comment two considerations put forward by Mr. Jorissen in the early part of his statement in support of his theory.

Mr. Jorissen states that the dispatching system was introduced in France in 1918 because our railways were not capable of dealing satisfactorily with the traffic occasioned by the transport of the American army. I must protest, in the name of all my French colleagues, that this is quite incorrect. We were in a position to deal with traffic greatly in excess of that entailed by the transport of the American army.

The dispatching system was first of all introduced on a section of line in the neighbourhood of Saumur, whereas the American traffic was confined to entirely different lines, and we dealt with it quite satisfactorily by our old methods of working.

Mr. Jorissen states, further, that after the war we were compelled to introduce the dispatching system in order to compensate for the inexperience of the large number of newly engaged employees. I must state here that this question has no connection whatever with the adoption of the dispatching system on our railways. The reasons which led us to introduce the system are those enumerated by the reporter, and they are entirely different from the reasons attributed to us by the Dutch delegate : they are the increase in traffic, and the facility which the system affords for regulating train movements and for ensuring a more efficient service.

I venture to add a consideration which supports what has been said by Mr. Lamalle, and which makes me hope that Mr. Jorissen will pay us a visit in order to observe on the spot the manner in

which our dispatching service works. When, in 1918, I and several of my colleagues went to see the American system in operation, we were very sceptical; we went, I might almost say, out of politeness to our allies, but we returned with the conviction that we had witnessed an important development in railway work, and that it would be in our highest interests to adopt a similar system.

I may add that when Mr. Lamalle, with a Belgian commission, came to inspect our system, he also was far from convinced as to its efficacy; he thought, indeed, that no particular advantage attached to it. After seeing it in operation, however, he so far recognised his error as to develop the dispatching system in Belgium to an even greater extent than we have done in France. That shows that the system possesses real advantage, and that it is in the interests of all railways to adopt it. (*Applause.*)

Mr. Moutier, Northern Railway of France (in French). — Gentlemen, I entirely agree with what has just been said, but I wish to add one word, namely, that it is desirable to distinguish between the instrument itself and the method of using it.

As regards the instrument itself, I think we shall all agree as to its utility. That is the first important point.

Then as to the method of using the instrument : the complete dispatching system, a modified form of dispatching system, or, in the case of certain railways, what I might even call an invisible form of dispatching. This is a question which depends above all on local circumstances and methods of working. From the moment the instrument exists, the manner in which it is used will depend on circumstances, and in this connection I would appeal to the testimony of the officers of the American transport corps who, on their arrival, assured me that it was impossible to work the French railways satisfactorily without the dispatching system. General Atterbury, the officer in command of the American Field Railway Corps in France during the late war, having been surprised to see that we had been able, under very varying circumstances and on a large number of lines, to run with complete safety a regular service of military trains without the dispatching system, asked Colonel Andriot, Military Commissioner attached to the Northern Railway, for a memorandum on the subject, and I was asked to prepare this. One cannot, however, compare the method of working on the American railways, where requirements change from day to day or even from hour to hour, with the system adopted in France, where time-tables are fixed, even for auxiliary trains. It is easy to understand that in the first case it is impossible to develop initiative on the part of local officials who, as the reporter has remarked, are « blind officials »; whereas, in France, with running diagrams prepared in advance, the maximum possible regularity of running is obtained. The station officials preserve their initiative, not needing in normal periods to resort to any central organisation.

Between these two extremes there exist a number of particular cases. At certain moments it may happen that there is a sudden rush of traffic in the neighbourhood of large stations, and the station officials may then have need of a co-ordinating hand. This is where the dispatcher comes in.

The methods of applying the system depend also on the countries and the particular railways. I think it is unneces-

sary to discuss these questions at length : each railway must decide them according to its own particular circumstances.

Mr. Renard, Eastern Railway of France (in French). — Gentlemen, I am entirely in agreement with what has been said by the previous speakers. I merely wish to add that I am convinced that one day Mr. Jorissen himself will be converted to the dispatching system, for I discover in his very arguments against the system certain points which are really in favour of its adoption.

Mr. Jorissen tells us that he considers train diagrams most useful, and that he would like to see them used in all stations. He tells us further that while the trains are running there is no system of control, but that, on the following day, there is a very strict examination of the reports and journals of the guards and station masters by the divisional and central superintendents. With the dispatching system as it is practised on the Eastern Railway of France, every morning the divisional and central superintendents receive a photographic copy of the actual train diagram for the previous day, which diagram is compiled by the dispatcher on the information which he receives as to the running of the trains. Under these conditions the control of the divisional and central superintendents can be exercised much more rapidly, and without the use of any additional staff, for we have dispensed with the employees who formerly examined the reports of the station masters and guards, placing them at the disposal of the dispatcher.

Mr. Jorissen (in French). — I should like to point out to Mr. Lamalle that I am well aware that the dispatching system was introduced in Belgium at a time when goods traffic was very heavy, but I know also that the system has been adopted on railways where the goods traffic is very small, particularly in Italy and on the Congo, and I think I am correct in saying that in these cases the system was introduced to compensate for the lack of experienced staff.

In reply to Mr. Renard I would say that I am certain that in cases where there is no dispatcher, the reports of the station masters and guards are more thoroughly studied in the offices of the traffic superintendents than they would be in the dispatching offices.

I would now like to put a question to Mr. Lamalle. I believe that on the diagrams drawn up in the offices of the dispatcher there is no indication of the normal service, and that this constitutes a source of difficulty.

Mr. Lamalle (in French). — The dispatcher has in front of him a theoretical diagram, but if this theoretical diagram were taken as the basis for drawing up the diagram of actual train journeys, the result would be an impossible confusion of lines from which no conclusion could be drawn.

Mr. Maison, Ministry of Public Works, France (in French). — Gentlemen, I had intended to describe the circumstances in which the dispatching system was introduced on the French railways, but this would now be superfluous as Mr. Payet has already done so in excellent terms with which I entirely agree.

The second point which suggested itself to me when I read Mr. Jorissen's memorandum relates to the advantages and disadvantages presented by the forms of dispatching adopted in France and Belgium on the one hand and in Germany on the other. Now it appears to me that there can be no comparison between the two systems, the underlying ideas of which are absolutely different.

The German dispatcher is in reality the organ of what are called the station control posts. We are well acquainted with this system, as it is the system which was and still is in force on the railways of Alsace-Lorraine. I do not deny the advantages which it may offer, even though it is expensive and the same advantages might perhaps be obtained by means of the system of organisation adopted in the larger French stations. The German system, however, has as its sole object the ensuring of safety of movement within stations; it has nothing whatever to do with train movements between station and station, and it is powerless to cope with the various incidents which may occur during running, as for example the breaking down of an engine, shunting which cannot be effected at the time intended, etc. Formerly these incidents often occasioned considerable delays and unpunctuality in the running of trains, especially on very busy lines, whereas at the present day the information supplied by the dispatcher enables immediate steps to be taken to ensure the regularity of the service.

In France we have adopted the system under which the dispatcher acts as an information officer; but this system tends to develop into a system under which he acts as a controller, particularly in the case of certain railways.

After the war, when times were difficult and traffic was very heavy, we were able, thanks to the dispatching system, to maintain a degree of regularity in the railway service which it would have been impossible to attain under the old system.

Our present system is so obviously superior to the German system that the administration of the Alsace-Lorraine railways is considering its introduction on certain sections of line. In France the results obtained have been so conclusive that the railway administration has not hesitated, in the general interests, to recommend the different sections to adopt the dispatching system to the fullest extent possible. (*Applause.*)

Mr. Jorissen (in French). — Gentlemen, I would again like to point out that the American dispatching system differs greatly from the French and Belgian system, while the latter system again differs appreciably from the English system. I think the various systems should be classified in three main groups.

In the first group there are the American and English systems, together with (as exceptional cases) the systems in force on certain European railways. Everything is regulated by the dispatcher without any intervention on the part of the station masters. I believe that in the *Code Standard* published by the *American Railway Association* you will not find the word « station » or « station master ». Further, in America the dispatcher gives orders to head guards who in turn give him information by means of portable telephonic apparatus with which they are supplied and which they can connect up with contact points on the journey.

The second group comprises several European railways. The system here is a mixed one, in which the control of trains is more or less in the hands of the dispatcher, but in which the station masters still find a place.

In the third group there is no centralisation, and everything, is regulated by the station masters.

Mr. Nobili, Italian State Railways (in French). — Mr. Jorissen has said that the dispatching system has been introduced, especially in Italy, on railways which have only a small goods traffic.

I think, therefore, that it may not be without interest for me to remark that it was after a visit to Belgium and France, in order to study the dispatching system as practised in those countries, that we decided to introduce the dispatching system in Italy. We are confident that by means of the system we shall be able to effect a great improvement in the service.

We have read in the report of Mr. Epinay that the station master, to use the word invented by the Americans, is « blind ». Mr. Jorissen on the other hand considers that he is « clairvoyant ». I think, however, that these two suggestions are not so contradictory as they appear at first sight. It may in fact be said that the station master is « clairvoyant », but his field of vision is very restricted, whereas the dispatcher has a greater range. The latter is consequently in a position to do things which are beyond the power of even the most efficient station master. (*Applause.*)

I would make one further observation : Mr. Jorissen says that when the traffic is very dense the dispatcher is not very useful, because in such a case there are three or four lines, which allows much greater latitude. I would suggest, however, to our Dutch colleague that on certain lines, particularly in Italy, there are cases of single tracks which have to carry a very heavy traffic. We believe that the dispatching system will enable us to avoid the necessity for constructing a second track on these lines, and this will mean a very considerable saving.

Finally Mr. Jorissen has said that on secondary railways the dispatching system was introduced to compensate for the lack of personnel. We in Italy intend to organise the dispatching system on secondary railways, but for quite a different reason : during the last two years we have dispensed with the services of nearly 60 000 railway employees who were superfluous; it is not, therefore, personnel which is lacking. What is important, as regards secondary railways, is not to employ more staff than is absolutely necessary. (*Applause.*)

Mr. Lamalle (in French). — Gentlemen, you will all realise that it is not possible to meet all Mr. Jorissen's objections out of hand. I shall therefore limit myself to adding that the causes which may determine the introduction of the dispatching system may vary greatly according to the railway concerned.

Thus, I have said that the dispatching system is particularly necessary on lines which carry a heavy traffic; but it must be remarked that there may be single track lines which have a very heavy traffic. It is therefore necessary to take into account the density of the traffic in relation to the capacity of the line.

Further, in countries of recent growth it may be advisable to introduce the dispatching system for quite other reasons. This is the case, for example, in the Belgian Congo, where the introduction of the system has enabled us to entrust the direction of certain stations to native officials. In such a case the regulation of train movements is in the hands of the European dispatcher.

Mr. Bayley, Sudan Government Railways and Steamers. — Mr. President and Gentlemen, we have listened with great interest to the various views of control of the different countries. It seems to me that they are bound to vary owing to the different conditions which prevail in the different countries. I should like to mention that the Sudan Government Railways prior to 1922 had a system of one central and district control. It was found

that the central control was overburdened with detail and could not readily focus the whole of the work of the line; therefore they had to introduce something which would relieve the detail work of the central control. A divisional office was introduced which brought about very good results. I think, in regard to these various systems that we are talking about, we want to know what practical results are obtained. With regard to our particular case, we increased our train and wagon loads, due entirely to better co-operation and the elimination of details at the central control. I think, in discussing this question, we should dwell on the practical results of these different systems. For instance are our passenger train loads, and our wagon loads being increased? Are the public better served? So far as our system is concerned, I might mention that the net load of our trains prior to the reorganisation was something like about 150 tons. I might mention that our trains' maxima are 600 tons or 25 vehicles. We brought that net load up to over 200 tons.

Mr. Epinay (in French). — Gentlemen, I do not wish to take up too much of your time, but I would like to say a few words in reply to an observation made by Mr. Jorissen in his memorandum — an observation which appeared also in my report but which I dit not reproduce in the special report.

The remark made by the Duch delegate is as follows :

From this it follows that the plotting of « auxiliary trains », that is, trains whose journey is fixed in advance but which are only run by special instructions on the days when they are needed is preferable to the introduction of special trains (trains whose journey is not fixed in advance but is decided according to the particular circumstances of the case), and at the same time the planning of these trains is a duty that should only be left to dispatchers or station masters when it is not possible to arrange otherwise.

I think, on the contrary, that one of the advantages afforded by the dispatching system lies precisely in the fact that it permits of the substitution of special trains for auxiliary trains, for it is certain that special trains are better calculated than auxiliary trains to meet daily requirements. For this reason, on the Belgian State Railways, there are now very few auxiliary trains : sudden rushes of traffic are dealt with by running special trains. As I pointed out in my report, an auxiliary train stands in a similar relation to a special train as a ready-made suit to one made to measure. I do not, in fact, think it is as difficult as Mr. Jorissen imagines to have a dispatcher who is in a position to arrange for special trains according to requirements.

I referred on page 644 (1) of my report to a series of operations carried out on a single track line, namely the line from Montluçon to St-Sulpice-Laurière. I showed that, thanks to the judicious measures taken by the dispatcher, a fast train which left Montluçon one hour late was able to make up 19 minutes without interfering with the running of any other train. It is evident that this result could not have been obtained with auxiliary trains, as the latter cannot be planned to make up for every possible delay of each train.

In the case of goods trains also, when a delay occurs it is certainly a great advantage to resort to the running of special trains. When a train is delayed excessi-

(1) See *Bulletin of the Railway Congress*, March 1925.

vely, its running is cancelled and it is replaced by a special train.

The possibility of meeting special traffic requirements afforded by the running of special trains appears to me an immense advantage.

Mr. Follows, *Reporter*. — Mr. President and Gentlemen, I should like in the first place to thank Mr. Epinay, the Special Reporter, for the very excellent summary he produced in connection with my report. It has appeared during this discussion that some confusion arises as to the different systems as regards the dispatching and train control. I rather anticipated that such confusion might arise, and as a result I made reference to that at the commencement of my paper. After all, what we are aiming at is to get the same result, that is, efficient and economical working. Mr. Lamalle and others have traversed a good deal of the ground in connection with the points that have arisen in argument, and I should like to say at once that I am entirely in accord with all that Mr. Lamalle has said. After all, the whole point with regard to train dispatching and train control is the need for it, and I think it is all summarised in about two or three words, namely, that it is essential on lines where the density of traffic is sufficient to warrant it. The Italian delegate made a reference to it being cheaper to provide improved methods in the shape of train dispatching and train control in preference to providing additional lines. It was entirely for those reasons that about 1907 the system of traffic control on British railways was evolved. We had reached a stage when, owing to the extension in works, improvement in trade and avoiding capital expenditure by having to provide additional lines, we were faced with a set of conditions that we were either to become liable for expensive capital expenditure or to operate more intensely the lines that existed. As a result of that, we started in a small way with train control, until at the present time train control on British railways means everything from the commencement of any movement to the termination of that movement, with supreme control over all the staff connected with those movements. Mr. Jorissen, in commenting on the dispatching system, made reference to the movements being conducted by members of the lower grade staff. I would submit, with respect and with much sincerity, that that reveals a defect in administration rather than a defect in any system. He also made reference to the train diagram, and in that respect I am fully in accord with him, because unless trains are diagrammed and you realise the work you have to deal with and schedule that work accordingly, you have no idea of and cannot apply any measure to the capacity of your railway.

In conclusion, I should like to say that I have formed this very definite opinion, that, whether it be train dispatching or whether it be train control, if those methods are applied intelligently by men who understand their business — and I believe that to day there is no room for an inefficient railway operator — given like conditions we shall achieve like results.

Mr. Matter, Swiss Federal Railways (in French). — Gentlemen, the three excellent reports which have been presented to the Congress indicate, as the principal object of the dispatching system, the satisfying of the following conditions : 1) Rapid handling of trains; 2) Increase in the speed of goods trains; 3) Reduction of working expenses. But the reports do not refer to the conditions which must be complied with in order to justify

the introduction of the dispatching system. In this connection I share the opinion of the Dutch delegate, namely that the desirability or otherwise of introducing the dispatching system must depend on the particular organisation of the railway concerned.

I have had the privilege of seeing the control system in operation in England, thanks to the kindness of one of Mr. Follow's colleagues, and I noticed that the organisation of station services and the planning of time-tables differed considerably from the system adopted in Switzerland.

In Switzerland there are three classes of goods trains : trains which stop at every station and carry the parcel traffic; semi-express trains serving the more important intermediate stations; and, finally, long-distance trains. As a general rule the latter trains undergo no change in make-up from the starting station to the terminus.

Apart from the regular time-table trains, auxiliary trains are also provided for, which are put on as and when required. Such trains are arranged for by the particular station at which they are required.

As regards passenger trains, we also provide for auxiliary trains when it is necessary to duplicate scheduled trains on certain days or at certain periods. Here again it is the stations concerned which decide as to the running of such trains.

In England the organisation is quite different. In the first place there are no different classes of goods trains. Further, auxiliary trains are ordered by the dispatcher, and the make-up of passenger trains cannot be modified without the authorisation of the dispatcher.

The number of scheduled trains is fixed after careful investigation. We endeavour to regularise the train service as far as possible, because in this way we secure the most efficient utilisation of both engines and train staffs. Further, the working periods of the staff can be easily planned in advance. As there is a regulation which says that overtime may be compensated for within a period of two weeks, we are able to arrange for the almost complete utilisation of the eight-hour limit.

Given these conditions, it is not certain that the dispatching system would afford any appreciable additional advantage in Switzerland, for we obtain a remarkable degree of punctuality, safety and speed in our goods train service. I consider that the dispatching system only justifies itself if the density of traffic exceeds certain limits, and if the existing organisation is inadequate to cope with it.

I venture, therefore, to put forward the following proposition to supplement the final summary of the reporter :

« The adoption of the dispatching system is to be recommended if, on part or on the whole of a railway, there is any complication in the running of trains either because of the density of traffic at certain periods or throughout the year, or because of local difficulties.

« The dispatching system might also prove useful for the organisation and execution of special branches of transport to or from ports or large centres. »

The President (in French). — Gentlemen, I think we may now consider the general discussion as closed, especially as certain observations that have been made, as for instance those of Mr. Bayley and Mr. Matter, will make it necessary for us to modify certain of the summary paragraphs (Nos. 4, 5, 6 and 7).

As regards the suggestions numbered 1, 2 and 3, these are in reality mere statements of fact as to which there is no need for lengthy discussion.

I will therefore ask Mr. Epinay to read the final summary of his special report.

Mr. Epinay (in French) read paragraph 1 :

« 1. — The « dispatching system » or « control system » consists in directing (or supervising, correcting without delay any mistakes which have been committed) certain traffic operations on a section, by means of a special organisation which is in rapid telephonic or telegraphic communication with shunting yards, stations, traffic posts and engine depots of the section.

« The main object of the « dispatching system » is to speed up the movement of traffic so as to obtain the maximum possible output from each line.

« In this sense the dispatching organisation may be required to deal with all or part of the following : supervision of the running of trains, particularly with a view to ensuring strict observance of the time-table; the giving of orders (or in the case of certain railways, advice) to stations, with regard to the fixing or changing of shunting points on double lines, and of passing or overtaking points on single lines; maintenance of a reasonable ratio between the number of trains run and the traffic to be handled, by the ordering of auxiliary trains where necessary and by cancelling certain scheduled trains on days when they can be dispensed with; the loading of trains up to their maximum capacity; selection of the type of engine for each train according to the nature of the work to be performed; changing the route of trains, or cancelling trains, in case of bad weather, accidents, or fouling of the line; supervision of make-up of trains to obtain complete trains for the longest distances possible with the least possible number of stops; regulation of traffic in the direction of terminal stations and ports of embarkation; mesures for dealing with traffic which does not form part of the regular traffic service; utilisation of engines other than those engaged in scheduled services.

« The dispatching organisation may also extend its activities to cover the following : distribution of rolling stock, the ordering of drivers, firemen and train staffs and control of their working conditions; the drawing up of running tables and diagrams; notification of official railway time; control of operations in shunting yards. »

Mr. Nobili (in French). — I would like to ask our English, French and Belgian colleagues whether, in their particular form of dispatching system, they make use of the telegraph or telephone. I think the telephone is calculated to give the best results.

Mr. Epinay (in French). — On certain European railways, particularly on the Norwegian railways, the telegraph is used for communication between the dispatcher and stations. This is also the case on certain American railways.

Mr. Nobili (in French). — I think the telephone is used in America.

Mr. Follows. — As regards railways in England, if you will look at the diagrams in my report (1) it will be seen that generally telephones are provided as a means of communication. There are, however, instances of branch lines where

(1) See *Bulletin of the Railway Congress*, number for February 1925.

the trains running over them are so few in number that telegrams are sent to save the expense of providing telephone wires, but about 99 % of the work would be done over the telephone.

Mr. Lamalle (in French). — In Belgium we use the selector telephone.

Mr. Epinay (in French). — We also use the selector telephone in France. As however, our final summary must record the actual situation in the various countries, we have also mentioned the use of telegraphic communication.

On certain railways, in Norway in particular, the telephone is used in principle when asking for information; the dispatcher's orders, and in particular those relating to changes of passing or overtaking points, are transmitted by means of the Morse telegraph, because it is considered that the telegraph is more reliable for this purpose than the telephone. This is not our opinion in France, but, as I have just said, our report had to record the actual situation in each country.

Mr. Pretorian, Roumanian State Railways (in French). — Gentlemen, I propose, in order to emphasize more clearly the different objects of the dispatching system, that we add, at the end of the second sub-paragraph, the words « while reducing working expenses ».

Further, I think that we might combine the first two sub-paragraphs, connecting them by saying : « ... and engine depots of the section, *with the object of speeding up the movement of traffic...* etc. » (*Assent.*)

Mr. Maison (in French). — I have no objection to the wording suggested by Mr. Pretorian. I would like, however, to suggest a slight modification in the wording of the resolution, so as to bring out more definitely one of the objects of the dispatching system, namely unity of control. In the first sub-paragraph I propose that we replace the words « a special organisation » by the words « a special official ». It is in fact always the dispatcher who decides. He may of course be assisted by other officials but the principle is to have a single responsible official at the head of the service.

Mr. Follows. — That would not be at all acceptable to the British railways. The word « official » obviously refers to a single individual, whereas the word « organisation » is comprehensive and embraces the whole of every department, and describes more accurately what exists in Great Britain.

Mr. Maison (in French). — In any case, there is always one higher official who gives the orders and who is responsible for the decisions which he takes, I consider, therefore, that it is preferable to say « a special official », but if the English delegates are not of the same opinion, I will not press the point.

The President (in French). — I will now put to the vote the first two sub-paragraphs in the revised wording proposed by Mr. Pretorian.

— Adopted.

The President (in French). — We now come to the third sub-paragraph which becomes the second.

Mr. Pretorian has a remark to make.

Mr. Pretorian (in French). — Gentlemen, in line 11 of this sub-paragraph it reads : « maintenance of a reasonable ratio between the number of trains run and the traffic to be handled, by the ordering of auxiliary trains where necessary. » After this I would say : « and by cancel-

ling certain scheduled trains where desirable... » etc., instead of « and by cancelling certain scheduled trains. »

A little further on the following words occur : « selection of the type of engine for each train according to the nature of the work to be performed. » I propose that we say : « On certain railways, selection of the type of engine... » etc.

Mr. Epinay (in French). — May I point out that I said : « In this sence the dispatching organisation may be required to deal *with all or part* of the following... » It therefore provides alternatives to fit the various cases.

Mr. Pretorian (in French). — Finally, towards the end of the sub-paragraph there are the words : « regulation of traffic in the direction of terminal stations and ports of embarkation. » I would prefer the words « in the direction of terminal or *frontier stations.* »

Mr. Renard (in French). — It would be preferable to say « terminal or transit stations » rather than « frontier stations ».

Mr. Pretorian (in French). — I accept Mr. Renard's amendment.

The President (in French). — I think, Gentlemen, that we are now agreed upon the following wording, which covers the amendments proposed by Mr. Pretorian :

« In this sense the dispatching organisation may be required to deal with all or part of the following : Supervision of the running of trains, particularly with a view to ensuring strict observance of the time-table; the giving of orders (or, in the case of certain railways, advice) to stations, with regard to the fixing or changing of shunting points on double lines and of passing or overtaking points on single lines; the running of the number of trains required by the traffic to be handled, by the ordering of auxiliary trains where necessary, and by cancelling certain scheduled trains on days when they can be dispensed with; the loading of trains up to their maximum capacity; selection of the type of engine for each train according to the nature of the work to be performed; changing the route of trains or cancelling trains in case of bad weather, accidents, or fouling of the line; supervision of make-up of trains to obtain complete trains for the longest distances possible with the least possible number of stops; regulation of traffic in the direction of terminal stations or frontier stations and ports of embarkation; measures for dealing with traffic which does not form part of the regular traffic service; utilisation of engines other than those engaged in scheduled services. »

— Adopted.

The President (in French). — We now come to the final sub-paragraph :

« The dispatching organisation may also extend its activities to cover the following : Distribution of rolling stock, the ordering of drivers, firemen and train staffs and control of their working conditions; the drawing up of running tables and diagrams; notification of official railway time; control of operations in shunting yards. »

— Adopted.

Mr. Epinay, *Special Reporter* (in French), read paragraph 2 :

« 2. — Dispatching centres may work independently, subject however to coordination with neighbouring centres as regards matters of common interest.

« They may also be grouped under the control of higher dispatching organisations (Belgian State, where the whole of

the dispatching units of the railway system are controlled by the Central Administration through a special organisation known as the « central dispatching »; United States, where on many railways the dispatchers of a given division are responsible to a chief dispatcher attached to the staff of the superintendent; Great Britain, where on certain railways there are, in addition to the local control centres, both divisional and central control organisations). »

Mr. Pretorian (in French). — Gentlemen, I propose that we combine these two sub-paragraphs, the resulting paragraph reading as follows :

« Dispatching centres may work independently, subject, however, to co-ordination with neighbouring centres as regards matters of common interest; or they may be grouped under the control of higher dispatching organisations. »

I would delete the remainder of the original paragraph, as it only contains statement of fact which appears in the report.

The President (in French). — The English reporter tells me that he agrees to the suggested revision.

— Paragraph 2, thus amended, is adopted.

The President (in French). — We will now take paragraph 3.

Mr. Pretorian (in French). — I would ask the Reporter to read paragraphs 3 and 4 together, as I think No. 4 should come before No. 3; it is in fact the complement of No. 2.

Mr. Epinay (in French) read Nos. 3 and 4.

« 3. — Rapid communication between the dispatcher and the posts with which he works in the controlled area is effected either by the Morse telegraph or by telephone, generally with a system of conventional calls based on the Morse alphabet.

« In a number of cases use is made of the selector telephone, which appears particularly well adapted to the needs of dispatching work.

« In most cases the dispatcher receives, from the posts with which he is in contact, notification of delays which exceed a certain limit, or of times of departure, arrival or passing of trains. He records this information on appropriate forms or registers, or on a map, or in certain cases on a diagram showing the actual running of all trains, this diagram being constantly added to as each notification is received.

« On lines where the density of traffic is sufficient to warrant it, this latter method appears the most satisfactory, as it gives the dispatcher, at any moment, a complete view of the exact situation regarding every train on his section.

« The same result is obtained on the British railways by means of boards on which cards corresponding to the various trains move according to the situation of the trains on the line. »

« 4. — Special mention may be made of the dispatching system in operation on the secondary railways of Czechoslovakia, where its adoption has made it possible to dispense with service superintendents at stations, the only officials concerned with train movements being the dispatcher and the head guards. »

The President (in French). — Mr. Pretorian proposes that No. 4 follow immediately after No. 2. No. 4, in effect, refers to a particular case which should logically be mentioned after the general case referred to in No. 2. (*Agreed.*)

Mr. Matter will now speak.

Mr. Matter (in French). — We are told that the introduction of the dispatching system in Czechoslovakia has made it possible to dispense with station masters at stations on secondary lines. But the staff of secondary line stations is not so busy with other duties that it cannot attend to the trains passing through the stations. I should like to know if this staff has also been dispensed with, or whether it is engaged on other duties, such as the issuing of tickets, registration of goods, etc.

Mr. Epinay (in French). — For Mr. Matter's information I may say that on the Czechoslovak State Railways the duties of station masters are confined to the commercial side of the business : they have nothing to do with train movements.

In Czechoslovakia — and also I think in Switzerland — it is the practice, in stations on single-track lines, to adopt a somewhat complicated system of signalling and an inter-locking system which requires a lot of attention. In stations on lines where the dispatching system is in operation this system has been definitely abandoned, train movement and signalling employees being dispensed with; the points are locked, and the keys are in the possession of head guards.

During my visit to Prague I was informed that it had thus been possible to dispense with one man per station.

This system is gradually being introduced over 2 500 miles of single-track line on the Czechoslovak Railways.

Mr. Matter (in French). — It is a case of small stations where there is little traffic. The operating superintendents or station masters must be present on the arrival of trains for the sale of tickets, etc. I can scarcely believe that it has been possible to dispense with the sole employee in the station.

Mr. Gaeremynck, Belgian State Railways (in French). — Tickets can be issued on the train.

Mr. Lamalle (in French). — I propose that the paragraph be deleted, as it only relates to one isolated case. This point was emphasized in the report, and I do not think it is necessary to reproduce it in the final summary, which should only deal with considerations of general application.

Mr. Epinay (in French). — I included it in the summary as an example of the economies which can be effected by means of the dispatching system, but I do not insist on its retention.

Mr. Pretorian (in French). — I support Mr. Lamalle's proposition.

Mr. Matter (in French). — I also.

Mr. Nobili (in French). — I am not in favour of deleting this paragraph because in Italy we are contemplating the introduction of just such a system on our secondary lines. I consider the example of Czechoslovakia very interesting, not only from the point of view of the number of kilometres of controlled lines, but also from the point of view of the possible future adoption of this system elsewhere.

Mr. Direz, French State Railways (in French). — On the French State Railways we are at present considering the possibility of dispensing with certain employees at stations where there is very little traffic. Tickets would be sold by a woman, who would come to the station for the purpose a few minutes before the arrival of the train. On a number of

secondary lines it is already the practice to employ women, who come to the station at various hours during the day.

We have even thought that in certain cases we might let the stations buildings, thus helping to ease the housing difficulty, and that we would do so rent free in return for the services of the tenants as regards the sale of tickets and registration of goods. We shall give this question very close consideration.

The President (in French). — Gentlemen, paragraph No. 4 records an interesting fact which the reporter has thought should appear in the final summary in order that readers who see nothing more than the summary may have it brought to their notice. It is indeed desirable to draw their attention to the possibility of dispensing with certain employees and thus effecting appreciable economies. Further, as we confine ourselves to recording the fact, without recommending the adoption of the system in question, I think we might well retain this paragraph, which certain delegates wish to delete.

In these circumstances I would ask Mr. Lamalle if he wishes to press his proposition for deletion.

Mr. Lamalle (in French). — No, Sir.

The President (in French). — Mr. Matter and Mr. Pretorian, do you also agree to the retention of this paragraph?

Messrs. Matter and Pretorian (in French). — Yes, Sir.

The President (in French). — Paragraph 4 therefore stands, but takes the place of No. 3. (*Assent.*)

We will now take No. 3, which becomes No. 4.

Mr. Pretorian has some observations to make.

Mr. Pretorian (in French). — I have nothing to say as to the wording of this paragraph, but I think it would be advisable to divide it into two parts : firstly, the first two sub-paragraphs, which would become paragraph 4; secondly, the last three sub-paragraphs, which would become paragraph 5. The first two sub-paragraphs indicate the manner in which communication is established, while the last three concern the functions of the dispatcher : we are therefore dealing with two distinct subjects.

Mr. Epinay (in French). — Agreed.

— Paragraph 3 of the final summary is adopted, and will become paragraphs 4 and 5.

The President (in French). — I would like to suggest, Gentlemen, that we postpone discussion of the last three paragraphs until to morrow morning's meeting. These paragraphs contain several questions of principle, which it will be desirable to discuss thoroughly.

There will be no meeting this afternoon, so that you will be able, as was decided at the beginning of the Congress, to devote as much time as possible to visiting the various places of interest in London.

I would ask you to be very punctual to morrow morning in order that we may be able to comply with the desire which has been expressed by the General Secretariat, namely that the wording of the final summary may be fixed and submitted to the vote of the General Meeting which is to be held to morrow afternoon.

— The meeting was adjourned at 1 p. m.

Meeting held on 1 July 1925 (morning).

IN THE CHAIR : Mr. DU CASTEL, PRESIDENT.

— The meeting opened at 9.30 a. m.

The President (in French). — Gentlemen, we will resume our discussion on Question VII : « Dispatching System ».

The Special Reporter will read paragraph 5, which will become paragraph 6.

Mr. Epinay, *Special Reporter* (in French) : « 5. — The power possessed by the dispatcher on certain railways to authorise goods trains to run in advance of their time-table when circumstances permit, seems calculated to increase considerably the output of a line. »

Mr. Lamalle (in French). — It is said that this power is calculated to increase considerably the output of a line. It is, however, a question of improving the running rather than the output itself, it being obvious that the running conditions react on the output. That is to say, at a given hour of the day it may be possible to dispatch a goods train ahead of scheduled time, whereas, if one waited for the scheduled time it might be that when the time arrived there would not be the same facilities for dispatching the train. The advantage lies therefore, in being able to dispatch a goods train in advance of the time-table when the occasion presents itself. It appears to me that for these reasons the paragraph might be redrafted as follows :

« The power possessed by the dispatcher on certain railways to authorise goods trains to run in advance of their time-table when circumstances permit, *has made it possible to improve the running of trains,* » instead of : « Seems calculated to increase considerably the output of a line. »

Mr. Direz (in French). — I consider that the possibility of dispatching a goods train in advance of the time-table will result not only in an improvement in the running of trains, as Mr. Lamalle suggests, but also in an increase in the output of the line as suggested by the reporter. I think, therefore, that mention should be made of both these results.

In practice, if a goods train is shunted in order to allow an express train to pass, and the time-table is planned in such a way that the goods train can follow after the express at a few minutes' interval, it will be possible, if the express is late, to dispatch the goods train before the official time. I think, therefore, that it is correct to say that the output of the line will thus be increased.

Mr. Pretorian (in French). — If a goods train is dispatched in advance of the time-table, this is an economy in the use of rolling stock, but the output of the line is not increased.

The output of a line depends on various factors, and if you use the phrase « to increase the output of a line » you are including other factors which are out of place in this connection.

The President (in French). — I believe Mr. Pretorian and Mr. Direz are under some misapprehension as to the meaning of the word « output » (« débit »), as used in the present connection.

Output is the theoretical capacity of a

line, *i. e.*, the number of train journeys which could be planned for that line. If then you take advantage of the possibility of dispatching a goods train in advance of the time-table, you will have been able, by the end of the day, to run a greater number of trains over the line than if this possibility had not existed. By the end of the day, therefore, the practical output will have increased, but not the theoretical output. We should find some form of words to make this point clear.

Mr. Maison (in French). — It is quite easy to find such a form of words. Mr. Lamalle's suggestion is quite correct; you improve the running, and this improved running results in an increased output. I think, therefore, that we should say : « ... is calculated to improve the circulation of traffic, and consequently to increase the output of the lines. »

The President (in French). — That is to say, the practical output.

Mr. Maison (in French). — Exactly.

Mr. Epinay (in French). —What I understood by the output of the line was the number of trains running over the line between midnight and midnight for any given day.

The President (in French). — Let us say, then : « ...makes it possible to improve the circulation of traffic, and, consequently, the output of the line. »

Mr. Follows. — Mr. President and Gentlemen, I quite agree up to a point with what Mr. Lamalle has said, and I can conceive that in some cases what would be described in England as the carrying capacity of the line would be increased by allowing the trains to go in front of time; that is assuming that there are two trains waiting to go over the same line at approximately the same time, but there is a number of cases, and they form a considerable majority, where on British railways it would be a disadvantage to allow a train to go in front of the booked time because it would clash with other trains almost as much as if running late. I would, therefore, suggest, Mr. President, that this paragraph should be amended in this way; with a very slight amendment I think we can make it cover the whole of the circumstances : « The power possessed by the dispatcher on certain railways to authorise goods trains to run in advance of their time-table when circumstances permit. » I do not suggest any alteration up to there, but instead of the word « seems » I would say « is » calculated. In some cases — those are the cases which the Reporter refers to — it is to improve the carrying capacity of the line. That would be quite clear for all British railway practice, and I should think if it were put in in your language it would be quite suitable.

Mr. Lamalle (in French). — No, it is the practical output which is increased, not the theoretical output.

Mr. Maison (in French). — Obviously; it is the practical output.

The President (in French). — Mr. Follows is really in agreement with the other gentlemen who have spoken, but, just as we ourselves have experienced a certain difficulty in finding the right French term, it is somewhat difficult to find the corresponding English term. I am unable to express an opinion as to the correct English term, but I suggest that in the French text we say : « ... d'améliorer la circulation des trains et, par suite, le rendement de la ligne. »

Mr. Maison (in French). — I agree.

The President (in French). — We will leave it to Mr. Follows to find the appropriate English term.

Mr. Pretorian (in French). — We might say : « ... to improve the utilisation of rolling stock. »

The President (in French). — The expression « rendement de la ligne » (« output of the line ») takes everything into account : number of trains, and utilisation of rolling stock and staff.

Mr. Follows. — I agree : it is only a question of terminology.

— The paragraph is adopted, as follows :

« 6 (former paragraph 5). — The power possessed by the dispatcher on certain railways to authorise goods trains to run in advance of their time-table when circumstances permit, seems calculated in some cases to improve the circulation of traffic and the output of the line. »

Mr. Epinay (in French). — Paragraph 6, which becomes paragraph 7, reads as follows :

« The experience of the British railways seems to show that the economic results of dispatching are susceptible of considerable improvement when the engine service (current maintenance and utilisation for hauling trains, excluding of course large repairs and construction) is under the same control as the traffic service. »

This is a statement based exclusively on the experience of British railways, and is derived from Mr. Follows' report.

Mr. Follows. — The President has asked me to give some details with regard to paragraph 6, that is : « The experience of the British railways seems to show that the economic results of dispatching are susceptible of considerable improvement when the engine service (current maintenance and utilisation for hauling trains, excluding of course large repairs and construction) is under the same control as the traffic service. » That refers to the system which is in operation on the London Midland & Scottish Railway, which makes the whole train unit under one supervision; that is to say, the organisation of the London Midland & Scottish Railway provides for the locomotive sheds, drivers, firemen, and other staff contingent upon the maintenance of those engines, to be under the control of the chief superintendent and his staff. The advantages are considerable, because the engine men and the train men, that is, the drivers and the firemen, are perhaps the most important units in transportation, and under the organisation which exists on the London Midland & Scottish Railway the men are under the same supervision as the remainder of the traffic staff, and therefore the supervision is constant. We have found great advantages from this particular system, and we think that you cannot make a better division than let the chief mechanical engineer construct the engine and let him have it returned to him when it has performed its service; in other words, it synchronises rather with the method that is in operation with a person who buys a motor car. A person buys a motor car; he runs the motor car and keeps it in good condition until wear and tear necessitate it going back for a complete overhaul. That is really putting as plainly as I can the system of the London Midland & Scottish Railway with regard to the control of their motive power.

Mr. Maison (in French). — I do not dispute the interest of this question, but it appears to me to be a matter concern-

ing the general organisation of a railway system, and I do not see that it has any direct connection with the question of dispatching. Consequently, however interesting it may be in itself, it appears to me that it should be omitted from the question of dispatching.

Mr. Lamalle (in French). — I intended to make the same remark as Mr. Maison. It is obviously a question of the sub-division of the railway service. In Belgium, for example, we divide the service into the following branches : traction and rolling stock; ways and works; traffic. The latter branch covers not only the train service, but also the distribution of rolling stock and the commercial side of the work. It is not possible to go on indefinitely adding to the duties of any particular branch of the service. It is all a question of circumstances. We have arrived at the same result as in England, but by other means, namely by the creation of what we call a « central dispatching ».

This « central dispatching » is installed at head quarters and is under the general superintendent, but it includes one or two employees from the traction service. By this means we obtain that collaboration which exists in England although we do so in a different way.

Mr. Payet (in French). — In France we have instituted regional dispatching centres similar to the « central dispatching » mentioned by Mr. Lamalle, and we have found the arrangement highly satisfactory.

As regards the resolution which is before us, I think it would be well to retain it because it records a most interesting experience. Everyone will be at liberty to derive from it whatever points may be of value for his own particular case.

Mr. Moutier (in French). — I would like to support the remarks made by Mr. Payet. Whether it is or is not directly connected with the question which is before us at the moment, the statement made by the representative of the London Midland & Scottish Railway is so important that it ought to be recorded.

We have everywhere suffered from the system of watertight compartments. As Mr. Lamalle has remarked, there are cases of perfectly organised services, under the control of officials who are undoubtedly qualified for their posts, but who work alone; while, on the other hand, there are other services which work on different principles. It is very important, in the interests of efficient working, that the activities of these various services should be co-ordinated in the common interest.

This question of the abolition of watertight compartments has received the close attention of the Northern Railway of France. Already, in the conferences between our mechanical engineers, we call in the engineers of other branches of the service. In the same way, the mechanical engineers are present at the technical conferences held by the traction and rolling stock engineers. Further, all officials, no matter for what branch they are intended, are attached for a time to the other branches. In large stations there is constantly increasing co-operation between the station master and the superintendent of the engine depot, resulting in a more efficient utilisation of rolling stock.

Mr. Follows. — Mr. President and Gentlemen, I think it would be as well if this paragraph were re-drafted, because there is no doubt that there are two opinions on this particular point. But I should like to say, in connection with the remark of Mr. Maison that this has no connection with the control or dispatching system,

that I think that could not be accepted, because, as I have said — and I think it will be generally admitted — the engine drivers and the firemen are one of the most important units in the movement of the train; therefore you cannot divorce the two with advantage.

With regard to the point referred to by Mr. Lamalle, we have tried the placing of two or three or more men in the locomotive department to work alongside the traffic department, and, whilst they did work well together and tried to co-ordinate with each other the fact remains that there were still two minds, and when a general opinion rests on a general compromise to my mind that has never been good, because neither of the individuals gets what he likes. There is a further point as to why the whole of these arrangements should be in the hands of one official, and it is a very important point too. There is a good deal of work to be done in a locomotive shed in the shape of the washing out of boilers and the examination of the various parts of an engine. It is surprising the amount of time that can be saved by selecting the suitable time to perform this class of work at the time the traffic permits it.

Mr. Lamalle (in French). — It is evident, as Mr. Moutier has aptly pointed out, that it is highly desirable for all railways to abolish the watertight compartment system which isolates the various branches of the service. On the Belgian State Railways we are giving the subject just as careful consideration as the Northern Railway of France is doing; recently, for instance, we have completely revised our provincial grouping, and we have appointed for each district a district superintendent who calls his colleagues together once a week, or more often if necessary.

The reporter tells us that on the British railways the value of the dispatching system has been considerably enhanced by placing the engine service under the same control as the traffic service. I agree that the result obtained is an interesting feature, but regarding the question solely from the point of view of dispatching, it is possible to achieve the same result without completely upsetting the administrative framework. This is the only point which I wished to make clear.

Mr. Pretorian (in French). — Gentlemen, on re-reading the text proposed by the English reporter, I wonder if he did not intend to say that the working of the dispatching system has shown that the results are better when the engine and engine staff service are under the same control as the train service. If this is the case it is not the dispatching system which has effected the improvement : it only serves to demonstrate it.

Mr. Epinay (in French). — Before a train can be dispatched, the necessary carriages, engine and staff must be available at the departure station; these different elements may be under the control of one official or of several; the experience of the London Midland & Scottish Railway seems to show that the utilisation of rolling stock and staff is more efficient when a single official has all these elements under his control and can make immediate decisions.

I repeat, as I was careful to say when I read out the paragraph, that it is an observation made by the English reporter, Mr. Follows, and that I had reproduced it for purposes of record.

Mr. Follows considers that the dispatching system works more efficiently and economically when there is unity of

control over the traffic and traction services. Obviously there is no intention of influencing anyone to change his existing organisation; we merely record a fact.

Mr. Moutier (in French). — That is exactly what I wished to say : there are things which are more important than words, namely facts. There is no need to discuss the point of whether the very interesting observation made by Mr. Follows is or is not directly connected with the dispatching system. We ought to realise that, however this may be, the important thing is that the observation should be recorded somewhere, it does not matter much where. An assembly like the present one, at which the highest officials of the railways of the world are gathered together, cannot afford to ignore a communication of such importance as the one presented by Mr. Follows. Let us therefore record it, and leave it to give its own lesson to those who read it.

Mr. Epinay (in French). — I will add only one word : I had the opportunity of witnessing the dispatching system in operation on the London Midland & Scottish Railway, and I may say that it is no small-scale experiment. The London Midland & Scottish Railway has 8 000 miles of line, entirely worked on the dispatching system. It is therefore an experiment on a large scale, and I agree with Mr. Moutier that it would be a mistake not to record the results obained.

Mr. Follows. — I consider that the wording proposed accurately describes the facts, but I would point out that on our railway the complete dispatching system is in operation over the whole of our lines and that it is necessary to limit the text to the dispatching question so as to avoid raising a much more general question.

The President (in French). — Gentlemen, to meet the views of the majority of the delegates who have taken part in the discussion with regard to the inclusion of a reference to the progress achieved by the London Midland & Scottish Railway, I propose the following wording :

« The officials of certain British railways consider that the economic results of the dispatching system are improved when the locomotive service (current maintenance and utilisation for hauling trains, excluding of course large repairs and construction) is placed under the same control as the traffic service. »

Mr. Maison (in French). — Very good.

Mr. Moutier (in French). — That is correct. Worded in that way, there is nothing imperative about the paragraph.

— This text is adopted.

The President (in French). — We will now take paragraph 7. The Special Reporter will read the paragraph.

Mr. Epinay (in French). — « 7. Wherever it has been adopted, the dispatching system has made possible an increase in the commercial speed of goods trains and an increased line output, making it possible to defer or dispense with certain work on extensions.

« On railways where the dispatcher controls the loading of trains it has been found that there is an increase in the tonnage carried per train-kilometre and a decrease in the engine journeys per effective ton-kilometre.

« In all cases the expenses entailed by the adoption of the dispatching system are more than compensated for by the economies resulting from its application. »

This paragraph will become No. 8.

Gentlemen, in order to avoid any misinterpretation I would draw the attention of the meeting to the first words of this paragraph : « Wherever it has been adopted, the dispatching system has made possible..., etc. » I do not mean to say that it would be a good stroke of business to introduce the dispatching system on a line which has three trains per day. It has only been introduced where there has been justification for it, and in these cases the results have been excellent.

— Paragraph 7, which becomes paragraph 8 is adopted.

The President (in French). — Gentlemen, Mr. Matter proposed yesterday that an additional paragraph be inserted. I will now give him an opportunity to support his proposition.

Mr. Matter (in French). — Gentlemen, we are now familiar with the objects of the dispatching system, and we have noted the experiences of the various administrations but in the various statements which have been distributed to us, as well as in the special report of Mr. Epinay, there is a gap: nowhere is there any indication of the conditions necessary to justify the adoption of the dispatching system. I ventured, yesterday, to hand in the text of a proposition designed to fill this gap.

The President (in French). — I have your text here, Mr. Matter, but I think it will be desirable to modify it somewhat. Here is the text proposed by Mr. Matter:

« The application of the dispatching system is to be recommended if on part or on the whole of a railway the running of the trains is adversely affected either by the density of traffic at certain periods or throughout the year, or by local difficulties.

« It further facilitates the organisation and execution of important special transport to or from ports and large centres. »

Mr. Nobili (in French). — Gentlemen, I consider that any proposition which tends to restrict the field of action of the dispatching system is to be avoided.

Why say that the dispatching system is only to be adopted when local difficulties are experienced or when traffic is heavy? There are many other cases in which the dispatching system may be advantageous. In Italy, for example, as I have already mentioned we apply the dispatching system on secondary lines, although there are no working difficulties there and the traffic is not very heavy : we apply it because it enables us to effect great economies in staff.

I am, therefore, unable to support Mr. Matter's proposition and if it is adopted I must insist that we add a reference to the case of the secondary railways.

The President (in French). — I think that Mr. Nobili has stated the question in its proper aspect. Are we to recommend the dispatching system? Would not this be premature, seeing that the experience of the various railways is not yet sufficiently extensive to justify our making a definite recommendation in this connection? It may, however, be useful to record the cases in which the principle of the dispatching system has been admitted.

I notice that Mr. Matter nods assent. I think, therefore, that I might propose the following wording, which takes into account the various observations which have been made :

« The section records that the dispatching system has been applied in cases where the railway administration has

found itself confronted by one of the following situations :

« 1) permanent or temporary difficulties on the whole or part of the railway, resulting principally from the density of traffic;

« 2) exceptional traffic on the whole or part of the railway (traffic to or from ports or large centres);

« 3) heavily loaded single-track lines;

« 4) lack of qualified staff on colonial railways. »

That is a simple statement of fact which will show those railways which may find themselves in one or other of these situations that, in certain countries, similar difficulties have been overcome by the adoption of the dispatching system. Do you agree, Mr. Matter?

Mr. Matter (in French). — Yes Sir.

Mr. Payet (in French). — Mr. President, I believe that Mr. Nobili was referring to secondary railways and not to single-track railways having a heavy traffic.

The case contemplated by the Italian delegate is that which has been alluded to in connection with the Czechoslovak railways, where the introduction of the dispatching system on secondary lines has made it possible to reduce the staff. This is a question which is also being studied at the present time by the French State Railways, as I mentioned yesterday.

The President (in French). — In that case the text should read :

« 4) secondary lines (reduction of train movement staffs at stations ;

« 5) lack of qualified staff on colonial railways. »

Mr. Maison (in French). — I think it would be much better to say nothing at all.

Mr. Payet (in French). — I am of the same opinion.

Mr. Nobili (in French). — My opinion also, as I have already said, is that it would be better not to include Mr. Matter's proposition.

I will now reply to the observation just made by Mr. Payet which I believe contemplated two particular cases : firstly, that of single-track railways with a heavy traffic, as occurs particularly in France on the Haute-Savoie section of the Paris-Lyons-Mediterranean; and secondly that of lines with little traffic where the application of the dispatching system makes it possible to reduce the number of employees at stations. I consider this very important from the point of view of the extension of the dispatching system.

Mr. Maison (in French). — I think it would be well to request Mr. Matter to withdraw his proposition.

We have included a statement as to utility of the dispatching system in the various cases in which it has been adopted. The resolutions which we have adopted contain all that is necessary on the subject, and railways will be able to draw from them what conclusions they think fit when they are considering the adoption of the dispatching system. I think, however, that it would be a mistake to endeavour to enumerate the cases in which the dispatching system would prove advantageous, becouse there would be certain to be some omissions. On the other hand, we must not specify certain cases of the adoption of the dispatching system without having sufficiently described them, so that there may be no confusion with cases which might appear similar but which in reality are not so.

I consider, therefore, that we should request Mr. Matter to withdraw his pro-

position, or that we should ask the meeting not to adopt it.

Mr. Lamalle (in French). — There is a great deal in what Mr. Maison has just said, for the dispatching system may quite well be adopted, although traffic may be small and working difficulties non-existent, merely in order to effect economies. This is the case which has just been put forward by Mr. Nobili.

The President (in French). — Gentlemen, before calling upon Mr. Matter I would like to point out that, whatever may be the fate of his proposition, it has had the merit of crystallising the discussion which has taken place on the whole question of dispatching. The proposition of the Swiss delegate and the discussion to which it has given rise will be recorded *in extenso* in the shorthand notes of the proceedings at this meeting. In these circumstances I would ask Mr. Matter whether he would be satisfied with this procedure.

Mr. Matter (in French). — Mr. President, I much regret that I am unable to withdraw my proposition. I consider that the general statements which we have made would be incomplete without an indication of the conditions in which the adoption of the dispatching system has been found useful and opportune. It appears to me that this is the logical complement of the paragraphs which were adopted yesterday.

We have said that the essential object of the dispatching system, is to ensure the rapid dispatch of trains with a view to securing the maximum possible output for each line.

The President (in French). — While reducing working expenses.

Mr. Matter (in French). — That may be the essential object of the dispatching system, but that does not prevent us from considering whether the dispatching system may not be advantageous under other conditions.

Mr. Direz (in French). — I would like to point out that in one of the paragraphs which have been adopted it is stated that wherever the dispatching system has been adopted, the economies effected have more than compensated for the expenses entailed by its introduction. This, then, is a further justification of the dispatching system. It has been reported that on certain railways the introduction of the dispatching system has made it possible to dispense with station masters on secondary lines. I might add that there are even lines with a heavy traffic on which, at night, we have been able to dispense with the safety service.

Mr. Pretorian (in French). — At the commencement of the final summary we have clearly defined the dispatching system and its objects. If, however, we indicate its objects we indicate at the same time the necessity for its adoption. If, therefore, we adopt Mr. Matter's proposition it will be necessary to alter the wording of the first paragraph, for it is in reality this first paragraph which is affected by the proposition of our Swiss colleague.

I therefore ask the President to put Mr. Matter's proposition to the vote. If it is adopted it will be necessary to modify the wording and to incorporate it in paragraph 1.

The President (in French). — I will now ask you to vote on the proposition put forward by Mr. Matter.

— The proposiiton is lost.

The President (in French). — Mr. Jo-

rissen has asked to be allowed to make a statement with regard to paragraph 3 (original paragraph 4).

Mr. Jorissen (in French). — I withdraw my request, Mr. President.

The President (in French). — Gentlemen, we have finished our task. Before declaring the meeting closed I wish to thank all the members of the third section for their assiduous attention to the business which has occupied us . Our discussions have been very interesting.

You will allow me, Gentlemen, to speak for you all in expressing our best thanks to the reporters, whose task has often been difficult, as well as to the secretaries and interpreters, whose work also has not been light and who, I have no doubt, have not been too pleased with the President when by chance he allowed too many members to speak at one time. (*Applause.*)

Mr. Lamalle (in French). — Gentlemen, I believe I am voicing the wish of all members of the section when I thank the President for the excellent manner in which he has directed our discussions. (*Applause.*) He has presided over us with complete impartiality (*applause*), at the same time accelerating the work so as to permit us to have the afternoons free.

I know that I am expressing your sentiments, Gentlemen, in asking you to pass a hearty vote of thanks to the President. (*Prolonged applause.*)

The President (in French). — Gentlemen, I thank Mr. Lamalle most sincerely, but I will observe the rule of brevity to the end so that you may have yet another opportunity of admiring the beauties of London before the General Meeting this afternoon. (*Applause.*)

Mr. Follows. — I should like to associate myself with the remarks made by Mr. Lamalle. I appreciate very fully the very able and courteous way in which our President has presided over our meetings. (*Applause.*)

— The meeting closed at 11.0 a. m.

DISCUSSION AT THE GENERAL MEETING

Meeting held on 1 July 1925 (afternoon).

IN THE CHAIR : THE RIGHT HON. Sir EVELYN CECIL, VICE-PRESIDENT.
GENERAL SECRETARIES : Sir HENRY FOWLER and Mr. P. GHILAIN.

Sir Henry Fowler, *General Secretary*, read the summary adopted by the 3rd section.

This final summary gave rise to no comments.

The President. — The following is therefore the

Final summary.

« 1. — The dispatching system or control system consists in directing (or « supervising, correcting without delay « any mistakes which have been committed) certain traffic operations on a « section by means of a special organisation which is in rapid telephonic or « telegraphic communication with shunting yards, stations, traffic posts and « engine depots of the section. The main « object of the dispatching system is to « speed up the movement of traffic so as « to obtain the maximum possible output « from each line, reducing the working « costs.

« In this sense the dispatching organisation may be required to deal with all « or part of the following : Supervision « of the running of trains, particularly « with a view to ensuring strict observance of the time-table; the giving of « orders (or, in the case of certain railways, advice) to stations, with regard « to the fixing or changing of shunting « points on double lines and of passing « or overtaking points on single lines; « the running of the number of trains « required by the traffic to be handled, « by the ordering of auxiliary trains « where necessary, and by cancelling « certain scheduled trains on days when « they can be dispensed with; the loading of trains up to their maximum « capacity; selection of the type of engine « for each train according to the nature « of the work to be performed; changing « the route of trains or cancelling trains « in case of bad weather, accidents, or « fouling of the line; supervision of « make-up of trains to obtain complete « trains for the longest distances possible with the least possible number of « stops; regulation of traffic in the direction of terminal stations or frontier « stations and ports of embarkation; « measures for dealing with traffic which « does not form part of the regular traffic « service; utilisation of engines other « than those engaged in scheduled services.

« The dispatching organisation may « also extend its activities to cover the « following : Distribution of rolling « stock; the ordering of drivers, firemen « and train staffs and control of their « working conditions; the drawing up of « running tables and diagrams; notification of official railway time; control of « operations in shunting yards.

« 2. — Dispatching centres may work « independently, subject, however, to co- « ordination with neighbouring centres

« as regards matters of common interest, « or may be grouped under the control of « higher dispatching organisations.

« 3. — Special mention may be made « of the dispatching system in operation « on the secondary railways of Czecho- « Slovakia, where its adoption has made « it possible to dispense with service su- « perintendents at stations, the only « officials concerned with train move- « ments being the dispatcher and the « head guard.

« 4. — Rapid communication between « the dispatcher and the posts with « which he works in the controlled area « is effected either by the Morse telegraph « or by telephone, generally with a « system of conventional calls based on « the Morse alphabet.

« In a number of cases use is made of « the selector telephone, which appears « particularly well adapted to the needs « of dispatching work.

« 5. — In most cases the dispatcher « receives from the posts with which he « is in contact notification of delays « which exceed a certain limit, or of « times of departure, arrival, or passing « of trains. He records this information « on appropriate forms or registers or on « a map or in certain cases on a diagram « showing the actual running of all « trains, this diagram being constantly « corrected as each notification is « received.

« On lines where the density of traffic « is sufficient to warrant it, this latter « method appears the most satisfactory, « as it gives the dispatcher, at any mo- « ment, a complete view of the exact « situation regarding every train on his « section.

« The same result is obtained on the « British railways by means of boards on « which cards corresponding to the « various trains move according to the « situation of the trains on the line.

« 6. — The power possessed by the « dispatcher on certain railways to autho- « rise goods trains to run in advance of « their time-table when circumstances « permit, seems calculated in some cases « to improve the circulation of traffic « and the output of the line.

« 7. — The officials of certain British « railways consider that the economic « results of the dispatching system are « improved when the locomotive service « (current maintenance and utilisation « for hauling trains, excluding of course « large repairs and construction) is « placed under the same control as the « traffic service.

« 8. — Wherever it has been adopted, « the dispatching system has made pos- « sible an increase in the commercial « speed of goods trains, and an increased « line output making it possible to defer « or dispense with certain work on « extensions.

« On railways where the dispatcher « controls the loading of trains, it has « been found that there is an increase in « the tonnage carried per train-kilometre « and a decrease in the engine journeys « per effective ton-kilometre.

« In all cases the expenses entailed by « the adoption of the dispatching system « are more than compensated for by the « economies resulting from its applica- « tion. »

— This final summary was ratified by the general meeting.

[656 .222]

QUESTION VIII.

SUBURBAN SERVICES.

General organisation of suburban services, including tubes, on lines exclusively used as such, or those not used for this purpose only (lay-out of stations and lines, signalling, rolling stock, time-tables, etc.).

Preliminary documents.

1st report (America and British Empire), by Messrs. E. C. Cox and A. R. Cooper. (See English edition of the *Bulletin*, January 1925, p. 31, or separate issue [with red cover] No. 12.)

2nd report (other countries), by Mr. Direz. (See English edition of the *Bulletin*, March 1925, p. 583, or separate issue [with red cover] No. 23.)

Special reporters : Messrs. E. C. Cox and A. R. Cooper. (See English edition of the *Bulletin*, June 1925, p. 2136.)

DISCUSSION BY THE SECTION

Meeting held on 29 June 1925 (morning).

Mr. du CASTEL, PRESIDENT, IN THE CHAIR.

The President (in French). — Gentlemen, the question of suburban service has been an important one in all countries, particularly since attention has commenced to be given to the housing of workmen and employees who work in the large towns.

On this important question we have a very complete special report submitted by Messrs. Cox and Cooper. By agreement with these gentlemen, I propose to discuss the question section by section, and not according to the findings in the summary, because it is probable that the discussion will lead us to combine some of these findings. (*Approval.*)

As we are in agreement, I will now call on Mr. Cox, the *Special Reporter*, to speak.

Mr. Cox. — Mr. President and Gentlemen, I will begin by reminding you that the reports on the question of suburban service have been drawn up by Mr. Cooper and myself for America and the British Empire, and by Mr. Direz, Assistant Traffic Manager of the French State Railways, for all other countries.

These reports are based on data received in response to two different questionnaires, but a general similarity obtains in regard to the information sought.

Report No. 1 is divided into two parts, the first dealing mainly with the suburban services of trunk lines, and the second with the sub-surface railways of London.

Report No. 2 relates almost exclusively to the lines serving Paris, including sub-surface railways; and the author mentions that in the territory under review, Paris is the only city where more than 4 000 or 5 000 suburban passengers per track per hour have to be carried, involving the making of special arrangements for their transport.

The subject matter of both reports can be conveniently divided under the following heads :

I. — Stations : terminal and intermediate;
II. — Track : lay-out and equipment;
III. — Rolling stock;
IV. — Operation;
V. — Fares;
VI. — General.

I shall accordingly, in the name of the reporters, submit to you a draft resolution under the heading :

« I. — *Stations : terminal and intermediate.*

« To obtain maximum capacity for the working of suburban services at terminal and intermediate stations, a detailed study of all requirements and facilities should be undertaken including the scheduling of platform occupation, engine movements and parallel working at junctions.

« The space at terminal stations can be used to the best advantage by arranging each platform between a pair of platform tracks. Island platforms at intermediate and junction stations make for economy in staff and facilitate interchange.

« Good interchange facilities should be provided at terminal stations in large cities between trains of the suburban lines and the distribution system within the city. »

Mr. Cox then read the draft of the new final summary that had been prepared in English. (This summary had not been translated into French, but a verbal temporary translation was given to the meeting.)

The President (in French). — This question has given rise to a complementary investigation and a new report by Mr. Direz, published in No. 5 of the *Daily Journal of the section*, p. 8.

I call upon Mr. Direz to speak.

Mr. Direz, *Reporter* (in French). — Gentlemen, the report that I have made on this question (report No. 2) was prepared in September 1924, and the particulars that have been supplied to me by the various railway systems extended to the end of 1923. Since that date suburban service has been greatly developed on certain French railway systems and the French Eastern System was led to take new steps in order to ensure its service.

As Mr. Renard, the delegate for the French Eastern System had very kindly informed me regarding the measures taken and the results obtained, I have thought it advisable to mention these particulars in the appendix to my report to which the President has just referred.

These new particulars moreover go to confirm what I have stated in my report.

Two main questions require to be examined in the working of suburban ser-

vices : the output of the terminal station and the output of the line.

The carrying capacity of the line can be appreciably increased by reducing the length of the block sections. Thus, on the Paris-Metropolitan and on the Nord-Sud line, it has been found possible to carry thirty trains an hour on one line, the trains following at intervals of 1 minute 45 seconds, whereas, on these lines the stations are much closer together than those of the London Tube railways. The mean distance between the Paris stations is only about 500 yards. Taking account of the stops at the stations, the interval of 1 minute 45 seconds between the trains must be considered as very small.

On the other hand, our surface railways which, up to the present, have worked their suburban services almost exclusively by steam locomotives, have not endeavoured to arrange high-efficiency block sections, because the carrying capacity of their lines is limited by the capacity of the terminal stations. Under these conditions, it appeared to be of special interest to begin with the study of this question of terminal stations and to endeavour to find means for increasing their capacity.

Some railway systems have found a solution by the electrification of their suburban lines. Actually, when a steam train arrives at a terminal station, it is necessary to uncouple the locomotive, which involves shunting operations, and to and fro movements that necessarily limit the capacity of the station. In France, on the State Railway System and on the Paris-Orleans System the suburban lines have been electrified in order to avoid the shunting of locomotives. The other railway systems, that have retained steam traction, have been led to simplify the shunting operations. From this point of view I feel certain that they will find the similar case, described by the English reporter as existing at Liverpool Street, of great interest; all the French delegates who visited this station were able to realise that, under the system installed there nearly all the difficulties due to the operations involved in shunting the locomotives are avoided.

When it has been found possible to reduce the difficulties that make the shunting of the locomotives so difficult, there remains the problem involving the operations of backing down the trains, which involve crossing over, and are themselves also a great obstacle to the intensive working of a terminal station. The Paris underground railways have eliminated these difficulties by means of loops at many of their terminal stations; where the installation of a loop was too costly, a lie-by siding arranged beyond the platforms, on to which the train was run after arrival, and from which the train was run to the departure platform, afforded nearly as good facilities for avoiding the crossing over of trains on arriving at and departing from the terminal station.

Owing to these arrangements, some of the Paris underground railways are enabled to carry from 19 000 to 20 000 passengers per hour on a single track.

The surface railways, limited by their terminal stations in Paris, have not been able to adopt these methods; in my report I have shown how it would be possible, by means of a rational arrangement of points and crossings at the terminal stations, to ameliorate, if not eliminate altogether, the difficulties arising from the crossing over of the trains.

The last remark that I should like to make is this : the reporters for England and America have given very instructive

examples regarding the practice in those countries. In the other countries, there are very few towns in which the suburban traffic is very intense. In the replies to the list of questions I have addressed to the various railway systems, I have found that it was only in Paris that there was a suburban service of sufficient magnitude to require special arrangements. The English reporters have, therefore, been able to obtain much more complete particulars than I have, and it is remarkable, that the investigations that we have made into this question have led us independently and without collaboration, to almost identical findings. This appears to show that we have made no error. (*Applause.*)

Mr. Pick, London Underground Railways. — Mr. President and Gentlemen, I think that before we can usefully discuss the question that is before us we need to determine what is meant by « Suburban services ». Mr. Cox and Mr. Cooper in their report treat as suburban services those which extend from the centre of a built up area for approximately a 30 miles radius. Mr. Direz has not provided us with a definition, but, looking at the illustrations which he uses, one would think that he contemplated a distance of no more than 20 miles radius at the outside. Both reports deal with railways which serve an entirely urban area, an area which is wholly built up. Mr. Cox and Mr. Cooper deal with the underground railways of London, and Mr. Direz makes references to the Metropolitan of Paris. I think we need to make a distinction between what I call urban railways and suburban railways, because I think such a distinction will help us to a solution of the problems when we come to deal with them in detail. Urban railways are characterised by a continuous short distance traffic, by a dense traffic and by a traffic which is simultaneously being collected and distributed throughout the length of the railway and not at a terminal station. A terminal station certainly does not afford reasonable facilities for urban traffic; it can only be dealt with by a continuous line with stations at intervals. On suburban railways, passengers make longer journeys, and faster trains can be provided which may run into special stations which act as quasi-termini for this class of traffic, and where passengers may change into the purely urban system which takes them into the centre of the community. If this policy is adopted, then the terminal stations proper can be much reduced in size, and there is no question but that large terminal stations in the centre of a city are extravagant and wasteful.

We have then the further problem to consider, that is the relation between what I have called the urban railway and the suburban railway. I think it is of the utmost importance that the urban railways should be carried to the belt or fringe of the city and should there be provided with exchange stations of the normal type for the suburban trains. The traffic which would be collected station by station on the urban system could be transferred to the suburban line by an interchange platform. And there are other good reasons why we should make this distinction. I notice in Mr. Direz's report that the practice in operation has been to provide rolling stock with accommodation for standing rather than for sitting, and that, owing to complaints, they have had to define the distances in respect of which such rolling stock may be used. They have come to the conclusion that they may use rolling stock de-

signed for standing passengers instead of sitting passengers up to 5 kilometres or 3 British miles. There is thus a difference in type which requires that we should distinguish between urban and suburban services, because the standing rolling stock can only be used for a limited distance and the other rolling stock has to be used for more distant places. So that, if you draw this distinction between urban and suburban railways, you will find the questions which have been put much easier to answer.

The President. — I think that the question has been very well put by Mr. Pick. The list of questions that was sent to all the railway systems related chiefly to suburban services.

Mr. Direz. — Mr. Pick has just said that the English reporters had considered a radius of 15 miles (25 km.) whereas in my report on Paris, I have spoken of a radius of 20 miles (32 km.). Actually it is not a question of miles but of kilometres. At the present time the intensive suburban service is limited to 20 to 22 km. (12.5 to 14 miles) but it is found that it has a tendency to extend further. This arises from the need, for inhabitants of large towns, to find their homes in places further and further from the centre of the town. This is how we begin to have what we call outer suburban services which go up to 25 miles (40 km.).

The limiting factor in suburban service is the carrying of the passenger who takes the train every day to get to his work. There are at present some people who live as far as 50 miles (80 km.) from Paris, and go there to work every day. They are not numerous, but as we progressively organise faster trains, the radius will extend. I think that the representatives of the other French railways agree with me in this respect.

In Paris, the difference between the urban and the suburban services is well defined; the urban service is limited by the old fortifications, which still surround the town but which will soon disappear. The Metropolitan and the Nord-Sud do not go outside this boundary.

I think that the urban service can be defined very exactly by saying that it is constructed for passengers who are obliged to move from place to place for their journeys inside the town at any hour of the day, whereas the suburban service is limited to people who live outside the town and only come in each day to their work. In Paris, those who do not live too far away are in the habit of going home to lunch at noon. Consequently, the passengers using suburban services make two or four journeys per day.

Mr. J. P. Thomas, London Underground Railways. — Mr. President and Gentlemen, the question of terminal facilities referred to in the resolution which is before you is possibly one of the most critical items of equipment in the running of a dense service. I will refer you to the report by Mr. Cooper and Mr. Cox [1], and you will see there a two-track lay-out at Hammersmith station on the Piccadilly Railway. The maximum number of trains which could be worked through a track facility of this kind is about 40 per hour; in fact, on the Hampstead Line, one of the underground lines in London, as many as 42 trains per hour have been worked in and out of a double track station. But the result of experience would lead us in the future,

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[1] See *Bulletin of the Railway Congress*, January 1925, p. 61.

were it physically possible, to provide three tracks; in those circumstances, whilst two tracks are sufficient in theory, it must be said that two tracks are not sufficient in practice. The reason for the third track is that any inequalities in the service may have an opportunity of being adjusted. With only the two tracks, no margin is available at all for any detentions in service which may occur, such as a slight accident to a passenger in boarding or alighting from the train, and with a dense service there is little chance with the two-track terminal to compensate for this. If this diagram on page 61 is to be regarded as an ideal terminal to a modern electric suburban railway, I should not be able to agree with it. There are other important reasons for the provision of this third track such as that of temporarily stalling a train in case of its failure, and, as does happen in electrical service, a train arriving at its destination may be unable to be worked back again, owing to a blown fuse or some other defect which has happened on the journey which prevents it being reversed and this impairs the operation of the service unless adjustment in interval is provided for. My view is that a three-track terminal should be included wherever it is physically possible, and the same should be provided with hydraulic or other power worked buffer stops, so that drivers may enter the station with confidence and at a fairly high degree of speed. Speaking of terminal accommodation, I think that one must refer to the reversal of trains by loops, a very popular practice in Paris and in certain parts of America. We on the English railways have also tried the reversal of trains on loops. At Charing Cross, for instance, on the Hampstead Railway, the Railway Company have a loop which runs partly under the river and partly under the foundations of the Southern Railway approach, and some of the large hotels. This was not put in by choice but we were obliged to do so in order to avoid the foundations of the considerable premises to which I have referred. We have found that the working of the loop has rather restricted the service. We have found the services there not to be so free in operation as with the ordinary cross-over terminal. Also we had perforce to put in a platform to do the double duty of entraining and detraining the passengers at the same time, and thus a train is held there whilst the whole of the « in and out » traffic is handled at that point. But I see no objection to a loop, provided two separate platforms can be provided, that is to say, at one point on the loop for entraining passengers and at another point for detraining passengers. I realise that this problem of loops is mentioned in the second item, but I felt that I could not differentiate between this and other forms of terminal accommodation. In my view if the loop can be provided with two entirely separate platforms there is no objection to it at all; and, further, if you can work a spur from this loop, so that a train can be stalled in case of its breaking down or in case of its requiring examination, there is no reason why the loop should not work perfectly well.

I want to mention this, if I may, that in the design of any type of terminal accommodation regard must be had to the fact that on the suburban service, at any rate in London, the services are reduced by 75 % as between the rush hours and the slack hours. Loop operation requires the trains to make a double journey round the line in order that they may arrive at the terminal or coupling point end so that

they may be correctly coupled. That is a disadvantage which does not obtain in the ordinary terminal accommodation, and I mention it here because this reduction of service of 60 to 75 % means a very great amount of work in the coupling and uncoupling of trains in the short period available for reducing the service as between the rush and the slack hours and *vice versa.*

The President (in French). — In order to take account of the remarks made by Mr. Pick and Mr. Thomas, Mr. Cox suggests a slight modification to his text. He proposes to say :

« To obtain the maximum carrying capacity for suburban services in terminal stations and in intermediate stations, a careful study should be made of all the requirements and all the possibilities. This investigation should comprise the working out of the time-tables determined for the occupation of the platforms, the movements of the locomotives, and the station service at the junctions.

« To use to the maximum the available surface at the terminal station, it is advisable to arrange these with a platform between two tracks.

« Island platforms at intermediate stations and junctions enable an economy of staff to be effected, and facilitate changes made by the passengers.

« Special installations for enabling the passengers to change should be arranged at the terminal stations either inside or in close proximity to the large towns, between the suburban railway and the urban lines. »

Mr. Renard, French Eastern Railway (in French). — I do not quite appreciate what is meant by the phrase that it is of advantage in terminal stations to place the platform between two tracks. It is evident, of course, that when there are more than two tracks, each platform is necessarily between two tracks with the exception of the two outer tracks.

It is not easy to understand what the reporter had in mind.

Mr. Cox. — The point here is that the conclusion we arrived at in summarising the replies was that it would be better to put two tracks only between the platforms and not three tracks; at intermediate stations one platform instead of two should be provided and it should be placed between the two tracks.

Mr. Renard (in French). — Then it should be stated that only two tracks should be placed between two consecutive platforms. Otherwise, the idea is not correctly expressed.

The President (in French). — Let us say that it is advisable to arrange a platform between each pair of tracks. (*Agreement.*)

The following, Gentlemen, is the final text to be proposed :

« 1. — To obtain the maximum output from suburban services, in the terminal and intermediate stations, it is necessary to make a close investigation into all the requirements and possibilities, an investigation that includes the determining of fixed time-tables for the times during which trains are standing at the platforms, for the movements of the locomotives and the execution of simultaneous operations at the junctions.

« In order to obtain the maximum use of the available area in terminal stations a platform should be provided between each pair of tracks.

« In intermediate and junction stations island platforms enable a saving in

staff to be effected and facilitate the passenger changes.

« Special arrangements should be provided in terminal stations in or near cities for effecting passenger changes between the suburban trains and the urban railway system. »

— This text was adopted.

The President (in French). — We now pass to article 2. I will call upon the special reporter to speak.

Mr. Cox, read section II of his special report, and the new final summary which he proposed, namely :

« The adoption of loops allows the redispatching of trains to be effected with the minimum of interference in the movements of the locomoitves and the trains.

« Instances of the application of this system are, however, not common and the arrangement for stabling sidings for locomotives at terminal stations and of flyover crossings enables the interference in the movements to be reduced.

« Automatic signalling with track circuits increases the capacity of the line and facilitates the working; the application of this system with luminous signals having multiple aspects allows increased capacity to be obtained particularly on lines that carry various classes of traffic. »

Mr. A. R. Cooper, *Special Reporter*. — Mr. President and Gentlemen, the subject now before the meeting is one which includes equipment, and I want to refer to a matter which is dealt with in this report relating to sub-surface railways. On page 70 of the report printed in English reference is made to the London Underground Railways having adopted the « shunt » type of escalator, that is to say, a particular type by which passengers step off sideways at the termination of their journey on the escalator. Reference is also made on page 70 to the underground railways carrying out an experiment with a different type of escalator, known as the « comb » type. That provides a different means for passengers getting off. Since this report was written that experiment has beeen carried out, and the underground railways of London have now adopted as a standard the « comb » type of escalator. The « comb » type of escalator has several advantages; it is rather cheaper, being shorter between the landings, and it has the advantage of being capable of being reversed in direction at a moment's notice. The London public from our experience have taken well to this type of escalator : we are of the opinion that when it has come into more general use the London travelling public will prefer this type of escalator, and we have now adopted that type as our standard.

Mr. H. A. Watson, London and North Eastern Railway. — Mr. President and Gentlemen, I propose to say just a few words with regard to No. 2 of the draft resolutions which have been circulated by Mr. Cox and Mr. Cooper. In the experience that I have had with regard to the working of suburban traffic, we have not been able to use loops, on account of the limited space at our disposal. The railways that I have had to do with have all been surface lines, and, as you will see, when a suburban railway has its terminus in the middle of a large city, and when it is a surface line, there is no opportunity for reversing the trains by means of loops. Therefore our practice has been limited to devising terminals more of the type shown in the diagram in the report, to which Mr. Thomas,

of the London Underground Railways, referred. We have adopted the same practice as is shown in the diagram of Hammersmith station.

With regard to intermediate stations, our experience has also been favourable to the island type. We have found by experience that it reduces the number of the staff required at the stations, and it is also more convenient from the point of view of the passengers. The only addition to the resolution I should like to suggest has regard to the provision of accommodation for the convenient moving of passengers both arriving at and leaving the station. I am not quite sure whether the President or the reporters will consider that my addition comes in better under clause 1 or under clause 2, but my own suggestion would be, subject to their approval, of course, that a clause relating to the use of island platforms should be put in, reading as follows : « provided that efficient arrangements are made for separating the stream of passengers arriving from the stream of passengers departing ». In our experience the only difficulty with the island type of platform has been the risk of confusion between the passengers who wish to depart by train and the passengers who have just arrived, and I consider it rather important that the resolution should make some reference to this point.

Mr. Cox. — With regard to Mr. Watson's suggestion, we submit that paragraph 1 of clause 1, which has already been dealt with, covers the point he raises with regard to the separate streams of passengers arriving and departing, although it does not make direct reference to this. You will remember under clause 1 it reads : « To obtain maximum capacity for the working of suburban services at terminal and intermediate stations, a detailed study of all requirements and facilities should be undertaken, including... » a number of things. We could have enumerated a number of other things, but the few we quote show that the point raised by Mr. Watson is a point which would come under review in connection therewith.

Major Hall, Ministry of Transport, Great Britain. — Mr. President and Gentlemen, I should like, with your permission, to say a few words in regard to the third and last paragraph of clause 2; that is to say, the reference which is made to track circuits and automatic signalling; particularly the arrangements to be adopted in connection with signalling apparatus generally for lines which have to carry different classes of trains. Hitherto the problem in this country has not been a serious one, mainly because it has in general been found possible to allot a pair of roads entirely to one class of traffic; that is to say, where on one formation both express traffic and intensive suburban traffic are running out to one district, it has usually been found possible to confine the express traffic to one set of rails and the suburban traffic to the other. The signalling system, therefore, and the arrangements generally can be designed to accord with the class of traffic which is running over the line. Under modern conditions however, particularly with the increase of the electrification of main lines for a certain distance from London, it is becoming increasingly difficult to assign a set of rails to one class of traffic, and the problem therefore before the experts of the Railway Companies today is how to make the best use of one set of rails; that is to say, to run an intensive suburban traffic up to the maximum capacity of the line, if express traffic has to

be interspersed on the same road with it. In the past, as the reporters have said in the body of their report, it has usually been the practice to signal such lines either for one class of traffic or for the other, and that must have a detrimental effect either upon the speed of the express trains or upon the capacity of the line for an intensive suburban service. It is the function of modern signalling — and we hope to see it in practice in a very short time on one of the trunk lines in this country — to lay out the equipment and signalling on the lines in such a manner as to be suitable not only for one class of traffic but also for the other, and so as to be able to handle the express traffic without any, or at any rate with only a small detrimental effect on the traffic capacity of the line for intensive suburban service. Perhaps you will allow me to make some reference to the system upon which this signalling is designed. Briefly it is this: The lay-out of the signalling generally is first of all set down to provide the maximum possible capacity for suburban work. That is practically equivalent to saying that the signalling spacing must be close, in order to reduce the headway of the trains, and it is that close signalling spacing which conflicts with the requirements of the express traffic, mainly for the reason that, unless this express traffic is to be slowed to suburban traffic speed throughout the whole of the suburban area, it will not be possible with your signalling closely spaced, as it must be for suburban working, to provide for the driver of an express train sufficient warning of a danger signal. In order to provide sufficient warning without reducing the speed of the express train throughout the whole of the suburban area, the modern signalling arrangements provide that this warning is carried back not only to one signal, but to two or three, or possibly four signals, if necessary, in order that the driver of an express train running at, say, 75 miles an hour will have sufficient warning of a danger signal to stop short of it. The system of these signals will be as follows : there will be a warning signal at a certain point, and then behind that again will be a preliminary warning signal, and behind that again will be either a further preliminary warning signal or probably a clear signal. The system of working would be that an express driver would act upon the warning at the first warning signal that he sees, and would reduce his speed to that of suburban trains by the time that he reaches the final warning signal, so that both classes of trains will be running at the same speed when they reach the final warning signals. That, as has been explained, is briefly the system which was dealt with in this section under the signalling item, and, as I say, it is shortly to be tried in this country.

It appears to us that some method of the kind is essential where two classes of traffic are operating over the same line which is to be worked to its maximum capacity. It applies only, of course, to the suburban line as defined by Mr. Pick, as distinct from the urban or distribution lines, which carry only one class of traffic and where this problem therefore does not arise. I have tried to explain how it is that it is a new problem in this country and has not arisen before. It will be of great interest to us who are interested in traffic matters in this country to see what the benefit of it is to the traffic. It appears to us that it can hardly fail to have at least some beneficial effect in maintaining the speed of the expresses and increasing the capa-

city of the line for the suburban trains.

Mr. Cox has asked me to mention something with regard to the actual signalling aspects which are to be used. It is proposed to carry out this signalling entirely without semaphores, that is to say, lights only will be used which are visible in the day : the signals in fact which were referred to in the report as luminous signals. For the line clear indication there will be a single green light and that will always be an authority to the driver of any class of train to run at the maximum speed authorised for that class of train and that section of line. The first warning aspect which it is proposed to use will be two yellow lights, which will mean one thing only. « The next signal but one is at danger. » The final warning is to be given by a single yellow light, which will mean : « The next signal at danger », which the driver must obey.

The driver, of course, will run at such speed that he will be able to stop his train before reaching at a signal standing at danger.

Mr. Direz (in French).— I agree entirely with the observations that have just been made. On our lines we have found the same difficulty. In proportion as we have wished to intensify the service, we have been obliged to reduce the length of the block section.

Generally, we have arranged warning signals to precede our danger signals. When the block sections are short, that is to say when they are shorter than the distance in which a train can be brought to a stop, we are forced, in the case of suburban and through trains running on the same lines, to limit the speed of the latter service. In this respect, the automatic block system has the advantage that in consequence of the instantaneous operation of the signals it is possible to reduce the space between trains without reducing the length of the block sections. We have found that when the signalmen are not watched, they take on the average 40 seconds to work the signals; the automatic block therefore saves 40 seconds in the space between trains. This is a definite advantage.

The greater number of luminous system signals of which mention has been made have been tried on a large scale on the French railway systems, particularly on the French State Railways. At the gates of Paris, on lines on which the traffic is the heaviest, we have installed this signalling system. The system has the advantage of simplifying the language of the signals, because they only give the driver a single indication meaning absolute stop, reduce speed, or line clear. Only one light is shown for each.

To continue the sequence of ideas expressed just now, I propose we should say :

« For intensifying the capacity of the line, the block sections must be reduced to short lengths, which involves imposing certain restrictions on goods trains and express trains running over these lines. »

We shall then proceed to say that luminous signals, while simplifying the signalling system, will allow the capacity of the lines to be increased.

Mr. Lamalle, Belgian State Railways (in French). — I think we shall all be in agreement in finding that the automatic block system allows a more rapid succession of trains to be run, but I should like to ask Mr. Direz whether he is considering the absolute block system or the permissive block system.

Mr. Direz (in French). — As the signals are not worked by a signalman, the

automatic block system necessarily requires that the train shall be able to pass a signal at danger without its being shown definitely that the track is clear; the train must be run at sight with caution. The question is whether this kind of block working is called permissive block or absolute block. In France, we call this system the permissive block. I think this is not the case in England, and that the English call it the absolute block system, because the system requires the train to be brought to a stop before a signal standing at danger. The English regulations if I am not mistaken, require a stop of three minutes; after this period has elapsed the driver may start his train, but must proceed with caution. On the French State Railways, we have not required this stop for three minutes, because we think that it is better that the driver should realise that he may find an obstacle a few yards in front of him. Before an absolute stop signal standing at danger the driver brings his train to a stop; the guard operates a special attachment which prevents the exploding of the fog signals that supplement the reading of the signal when at danger and hands the driver the written order to proceed at sight.

The driver can proceed at speed as soon as he sees that the signal ahead is off.

Actually, we have now come to the conclusion that the only object of the signalling system is to ensure the safety of trains running at full speed. But that, ling system is to ensure the safety of order, safety is adequately ensured by a regulation requiring the trains to be run at sight in the same manner as that adopted for urban tramways.

I should add that on the lines on which this system is applied, we arrange that the block sections shall not be appreciably longer than 1 km. (1 100 yards), in order that the driver may not be required to drive at sight for a long distance.

The President (in French). — Mr. Cox will read us the proposed wording of the summary, slightly modified so as to take account of the remarks that have been made.

Mr. Cox. — It appears to me, Gentlemen, that, although the systems differ somewhat in England and in France, there is really no contradiction in the statements that have been made by the last two speakers; therefore, I think they will be able to subscribe to the form of resolution which I have submitted to your consideration. May I be allowed to read it again?

« *Track : lay-out and equipment.* — The adoption of loops allows the re-dispatching of trains to be effected with the minimum of interference in the movements of the locomotives and the trains.

« Instances of the application of this system are, however, not common and the arrangement for stabling sidings for locomotives at terminal stations and of fly-over crossings enables the interference in the movements to be reduced.

« Automatic signalling with track circuits increases the capacity of the line and facilitates the working; the application of this system with luminous signals having multiple aspects allows increased capacity to be obtained particularly on lines that carry various classes of traffic.»

You will see that we have modified the text of the last paragraph in the manner suggested by **Major Hall.**

— The text was adopted.

The President (in French). — I call upon Mr. Cox to read article 3.

Mr. Cox. — The subject dealt with under the heading of article 3 is one in which much interest is being taken; it is undoubtedly of very great importance because it deals with the rolling stock. I will not occupy the time of the Congress by reading our full summary of the data received relating to rolling stock. I will merely submit for your discussion and approval a draft resolution which reads as follows :

« Compartment stock, on account of its high seating capacity, is preferred where the journey is to the outer suburban area. Saloon (open) stock is more suitable for short journey distribution work, where stations are only about half a mile apart and the provision of seats for all passengers is less important. Provision should be made for large carrying capacity per unit of length and for ample door space. »

Mr. C. F. Smith, New York Central Lines. — Mr. President and Gentlemen, may I say that I notice in the first paragraph of the summary it says that « Compartment stock, on account of its high seating capacity, is preferred » under certain conditions. In America our stations are not enclosed, we have low platforms, and it is necessary, of course, for conductors to get through to collect their transportation. On the New York Central Railroad our equipment seats about 70 to 84 passengers, with two seats on each side of the aisle. That might possibly be increased by making three seats on one side and two seats on the other. The seating capacity of the car would then be somewhere round about 100. In very short journeys we have been compelled to permit passengers to stand up in some of the suburban trains, but where they go a reasonable distance, possibly more than 8, say to 25 miles, an effort is made to provide a seat for everyone. The equipment is restricted in length on account of its being compelled to go round the lower level loop in Grand Central terminal; anything larger than that would not go round. The seats themselves have about 34 inch centres and to get them any closer would not enable passengers to get in or out with any degree of comfort. We have had no experience whatever with compartment stock. We find the loading and unloading of passengers quite rapid.

Mr. Payet, French State Railway (in French). — Gentlemen, I do not think we can state in such absolute terms as the reporter has proposed a preference for this or that type of vehicle. We should merely say that compartment stock should be preferred for long distances, but compartment stock is not always to be preferred. Thus, in the electrification of our lines, we have given preference to the saloon type because, in the terminal stations at Paris, we have the great advantage of being able to change the set-trains. We can use the same set-trains either for the near zone or for the far zone.

I ask, therefore, that the summary should not be made so absolute. I think that in this respect the first draft made by the reporter was better, because it only considered the use of compartment stock for the longest suburban service.

Mr. J. Coates, Oudh and Rohilkhand Railway, British India. — May I ask Mr. Smith if he provides any lavatory accommodation in his suburban trains; is that found necessary? He said that he endeavours to find seating accommodation for all passengers. In the case of a big crowd turning up for a particular

train does he prevent those passengers getting into the train who are in excess of the seating accommodation? This is a question of some interest to me, because in India we have frequent complaints about overcrowding in trains. I should be very glad if I could get any information about that from Mr. Smith.

Mr. C. F. Smith. — We do provide lavatory accommodation in all our equipment. On standard equipment we have one for men and one for women ; on the suburban locals only one. So far as the standing of passengers is concerned, if a schedule is disarranged or if a large number of people show up we let them on board the train but we do not go at any time beyond the safety mark. In the making up of trains at terminals we try to have extra equipment on hand beyond the number of cars necessary, and we take such of them as are required.

Mr. Renard (in French). — Gentlemen, I read in the special report of Messrs. Cox and Cooper that the carriages with enclosed roof seats running on the French Eastern Railway are disliked by the public on account of the low height of each storey. It is added that in this class of vehicle the loading and unloading of the passengers takes place very slowly.

I do not think it is quite fair to say that this rolling stock is disliked by the public. I am certain that the public prefers to travel for a distance of 10 to 13 miles seated in these carriages rather than travel standing in the ordinary saloon carriage. Moreover, once seated, the passenger is quite comfortable; and after a long day's work one prefers to travel sitting to standing.

It has often happened that we have been obliged to substitute an ordinary train for a train of two-storey carriages, and, on almost every occasion, we have received complaints from the regular travellers by these trains.

With regard to the time taken in loading and unloading the passengers, it is quite true that these operations take longer with the two-storey vehicles than with the ordinary type of vehicle, but the important point to consider is not the number of trains that can be run over a line in a given time, but the number of passengers that can be carried in that time. Now, if this is taken as the basis for calculation, we shall be forced to recognise that the two-storey carriages have the advantage because of their greater carrying capacity. The loading and unloading certainly do not take double the time necessary for the same operations on trains consisting of ordinary type of vehicle.

I wish to make this remark because the French Eastern Railway wishes to continue to use the two-storey vehicles, to which our passengers have raised no objection.

Mr. W. Clow, London & North Eastern Railway. — On the Great Eastern section of the southern area of that railway, we handle a very heavy suburban traffic. At Liverpool Street we deal on an average with 250 000 people a day. We have in the summer period 1 000 trains a day. Most of those trains that handle the suburban traffic are made up to carry 840 people, each of them seated. That number during the rush period is very much exceeded. On one or two occasions I have known the number doubled. We handle these in carriages of 10 compartments each; they are 9 ft. 2 in. wide, and they will carry 120 people each. We could not possibly handle those people with saloon stock or open stock. Our average stop at stations in

loading up and unloading is 25 seconds. Many of those stops are accomplished in less than 20 seconds. As I have said before, we could not possibly handle those people unless there were doors to each compartment. I have had some experience of open stock, and I think that possibly if we had to handle that number with open stock we should require 40 seconds at each stop.

Mr. B. G. Smith, North Western Railway, British India. — Mr. President, this question of saloon stock and ordinary compartment stock is of great importance to Indian railways. We have a very heavy traffic at certain hours of the day, and the trains are very much overcrowded. The question of loading and unloading trains makes a great deal of difference to the number we can run. We find that with the compartment stock we can handle passengers much better; we can load and unload in half a minute, but with the saloon stock it very often takes a minute longer to do the same work, so that this statement here in the third paragraph is not borne out by our experience.

Mr. Payet (in French). — I think, Gentlemen, that we are speaking of different services given by the two types of vehicle under consideration. Mr. Clow spoke just now of the working of the suburban service at Liverpool Street Station; it is extremely interesting and was greatly admired by us, but we also have a very heavy suburban service on the lines of the French State Railways, and we are now engaged in making an interesting comparison of the two types of carriages; some of our trains hauled by steam locomotives are made up of compartment stock, whereas our electric trains are composed of saloon coaches capable of carrying up to 180 passengers. Now the theoretical stopping time for our electric trains is 30 seconds and in actual practice it does not generally exceed 20 seconds. It is not correct therefore to say that this type of vehicle requires a stop of one minute.

Mr. Direz (in French). — I think we should make a distinction between the various saloon coaches because they are not all of the same type.

During my travels on the London Underground Railways I was struck by the fact that in the saloon stock running on this railway system the passengers entered and left only at the ends of the coaches : it appears to me to be certain that this type of saloon coach must involve long stops at the stations, when the passenger traffic is heavy. But the saloon coaches that we use in France have three double sliding doors each capable of giving a wide opening with this stock, which is the stock in general use on the Paris Underground Railways and on the French State Railway System, the stops never exceed 30 seconds even during the rush hours.

Mr. H. J. Graham, Great Indian Peninsula Railway, British India. — Mr. President, will you permit me to say one word? In Bombay, where there is a heavy suburban service, which is very similar to that of large Continental towns, and towns in England, the saloon type of stock has been decided upon. I should like to make that remark because I did not quite understand Mr. Smith when he said that in India the compartment stock was the system adopted.

Mr. B. G. Smith. — The disadvantage in using saloon stock is that it is very difficult to get the passengers in and out quickly, but with ordinary compartment

stock passengers can be got into and out of the train in a very short time.

Mr. de Vasconcellos Correa, Portuguese Railway Company (in French). — Gentlemen, there is one point that has not been taken into consideration; the question of the number of seats provided. It appears to me that for equal numbers of seats the compartment carriages allow of more rapid unloading of passengers than the saloon type. In fact, if in the latter it is desired to have as many seats, it is impossible to arrange side doors; all the passengers have therefore to get out at the ends, which is much slower under these conditions than in the compartment carriages.

Mr. Cox. — Before reading the summary, Mr. President, may I just make a slight correction? Mr. Direz has referred to the Underground Railway in London as only having doors at the end. I think our friends from the Underground Railway would be able to assure him that that only applies to their old trains and that the modern carriages have intermediate doors.

The following is the wording of the proposed summary.

« 3) Saloon-type stock without compartments is preferable for urban lines on which the passengers make short journeys only, where the stations are only about half a mile apart, and where the provision of large seating capacity is of less importance.

The carriages of suburban trains should afford large transport capacity per unit of length, and should be fitted with several doorways of large size.

When the platform allows, and in the case of the service to the suburbs near the city, this method is equally economical.

In the case of the outer suburbs, compartment stock is more usually adopted because of the greater seating accommodation it provides. »

— This text was adopted.

Mr. Cox. — The fourth item in the summary deals with the question of operation. After carefully examining the whole of the data prepared, we have drafted a resolution which we beg to submit for your consideration and discussion and which reads as follows :

« 4. — Economy and speed can be secured in rush hours when trains are frequent, by a system of zoned stops, so that train loads are concentrated for distribution to as few points as possible; but a reasonably frequent service should be provided at all stations with due regard to their importance.

« During the slack hours the requirements can best be met by trains of a short length run at uniform intervals and as a rule calling at all stations.

« The use of the multiple unit system with electric traction provides the maximum flexibility for handling suburban services.

« It is desirable that railways should be empowered to close certain minor stations near the central terminal where the receipts are small and the provision of a service onerous. »

Mr. H. A. Watson. — Mr. President and Gentlemen, I wish to support the resolution with regard to the operation. I attach importance to what is said in it with regard to the system of zoned stops so that the train loads are concentrated for distribution to as few points as possible. I have found in my experience that not only is it a great help to the handling of the traffic but it also

tends to increase revenue if people who are travelling every day from the centre of the city to the suburbs can travel by a train that has as few stops as possible. When the suburban service with which I was more especially connected began to develop, we developed it on the lines of running as many trains as possible with only one stop, at the terminus, and the popularity of this arrangement was very remarkable; it tended to increase the traffic very considerably, and the public expressed their great appreciation at what had been done. I therefore wish to support the first clause of this resolution.

With regard to clause 2, which reads as follows : « During the slack hours the requirements can best be met by trains of a short length run at uniform intervals and as a rule calling at all stations », our experience is also in favour of that clause of the resolution.

With regard to clause 3, which reads : « The use of the multiple unit system with electric traction provides the maximum flexibility for handling suburban services », I may say that the suburban service to which I referred was run, when I first had charge of it, by steam trains, and 21 years ago we converted the service to electric trains, and our experience confirms the great advantage of introducting this multiple unit system with electric traction.

With regard to clause 4, our experience is also in favour of this part of the resolution. Our experience has been that the minor stations near the central terminal have become unremunerative to keep open. This is largely due to the fact that the provision of tramways and road motor-buses tempts people who have only such a short distance to travel to prefer travelling on the streets, either by tram or by bus, because the trams and buses deliver them much nearer either their place of business or their residence. In our experience it is not profitable for a Railway Company to attempt to compete with trams or buses for such short distances as the distance between the main terminal and these other small stations in the city. According to my experience, I think the distance might be put at something between three miles and six miles, according to the circumstances of the particular case.

— Article 4 was put to the vote and adopted.

Mr. Cox. — Upon the very important subject of fares we have an extraordinarily small amount of data. As we have put in our summary, suburban traffic is characterised by a low rate for ordinary fares, the average being much less than the rate of longer distance fares, and there seems to be an idea, dealing with large suburban traffic, that the rates charged for workmen who follow the rush of daily labour are therefore lower than they should be, and we have put forward this resolution :

« *Fares.* — The fares charged for different classes of traffic vary considerably in different countries. Each class of traffic must at least produce more revenue than the costs directly attributable to the working of that traffic. » You will see in that draft resolution we have made no direct reference to any specific class of traffic or specific class of traveller; we thought it would be better to leave it in this way, subject to your approval, and say that : « Each class of traffic must at least produce more revenue than the costs directly attributable to the working of that traffic. »

Mr. F. Level, General Company of rail-

ways of local interest, France (in French). — Gentlemen, I think that we shall all be in agreement on the last paragraph that has been proposed.

If I have correctly understood the translation that has been given to us, the idea of the reporter is that each class of traffic should produce at least sufficient revenue to cover the cost of its share of work. But I think it will be advisable to deal with this matter more fully.

Mention was made just now of the competition between railways and motor-buses and tramways; but generally, at any rate near large towns, the motor-buses and tramways have occasion to complain of the competition of the railways in consequence of the extremely low fares charged by the large companies on their suburban services.

What we ask is that suburban traffic should pay the same share of expenses as the other traffic. There is no reason why it should be worked at a loss. I would ask therefore that the second paragraph should be replaced by the following wording :

« From this point of view it is recommended that the large railway companies should not be required to run suburban services at fares that involve the company in considerable loss, which is borne by the whole undertaking, and forms an unfair and uneconomical competition with other modes of transport that are thereby caused also to work at a loss.

Mr. Lamalle (in French). — Gentlemen, it should be stated that the large railway companies not only carry passengers but also goods. Now, if it were necessary to get passenger fares sufficiently high to cover the cost of transport, these would become prohibitive. On all large railway systems passengers are carried at a loss, and it is the goods traffic that enables the budget to be balanced or a profit to be made.

I think, therefore, that instead of saying that each class of transport *must* produce revenue in excess of the expenditure relating to that traffic, we should say, *ought to* produce, etc.

Mr. Moutier, French Northern Railway (in French). — Gentlemen, it should be noted that the question deals with suburban services, and that consequently the extension of the meaning to include other services does not necessarily follow from the last paragraph of the summary. Mr. Level is therefore correct in asking that the summary should refer to suburban services only.

The President (in French). — The reporter points out that the English text is more correct because the word « fare » applies to passengers only. Consequently the correct translation should be :

« The fares for the various classes of passengers vary considerably from country to country.

« Each class of traffic should at least cover the charges directly incurred by it.»

Mr. Moutier (in French). — I prefer the wording proposed by Mr. Level who has returned to the real point of the question. We are speaking on the subject of suburban transport, and we must keep to it as close as possible. Mr. Level's suggestion on this point is quite right. If it were a question of examining the subject from a general point of view as desired by Mr. Lamalle, other views might require to be expressed, but, as I have already said, it is a question of suburban services only, and it is why I support the text proposed by Mr. Level.

Mr. F. Level (in French). — Gentle-

men, I ask to be allowed to insist on the wording that I have proposed.

It is quite clear, as I have stated, that we are discussing suburban services only. The fact that we especially wish to bring out is the extreme course taken by certain countries in reducing the suburban fares to too great an extent in comparison with the fares of passengers on the main lines. Consequently there is no disadvantage in adopting this wording, as it applies neither to the general fares paid by passengers nor to the goods rates. My wording applies only to suburban fares, which, in certain countries, amount to as little as one tenth of the ordinary fares. We hope, therefore that the Congress will express an adverse opinion on this practice. (*Applause.*)

Mr. Cox. — The President asks if I will just explain the position so far as we feel it in this country with regard to the low fares that are charged for the conveyance of workmen in connection with suburban traffic. Although the position is not so acute here as it is in the districts to which the last speaker referred where the suburban fare is about one tenth of the ordinary fare, yet there is in this country — and, if I may say so as a reporter, there is in all countries which deal with a large suburban or workman traffic — a very strong feeling that the fares have been reduced much below what they ought to be. There are reasons in the different countries which have accounted for this, but, in framing the resolution with a full knowledge of those facts, we felt it was better to leave out any special reference to any individual fares or any special class of traffic, and say that each class of traffic should produce more revenue than the working costs directly attributable to that traffic. I am sure, Gentlemen, it is not your desire that, as a result of this Congress, anyone should feel that we have been saying something that we have no right to say, or that it shall be given out as a handle to some class of individuals or traders, to use our arguments in the enforcement of a reduction of the charges. Therefore I would suggest that the resolution should remain as it is.

Mr. Moutier (in French). — Gentlemen, we must avoid any misunderstanding : we are now speaking on economical grounds and not on technical grounds. We do not want to lose this opportunity for expressing our admiration of the management of the service in the London terminal stations and particularly that in Liverpool Street Station.

The resolution says clearly that the development of suburban services in the capitals of all countries will become difficult, if not impossible, if it does not pay. Such is the case in many places.

When an industrial concern does other work than that for which it was designed, the result is bad. This is not of great importance when the existing means enable it to continue this work, but it is quite different when its original purpose requires its whole resources. The service over and above the normal overwhelms everything, and paralysis if not bankruptcy is the result. The same thing happens with a public service.

All the great railway lines which terminate in the capital cities are moreover long distance lines. The termini of these were established in the area covered with buildings, often under conditions that do not permit of extension, and the railways need all their resources. They have, however, suburban services which do not pay and for which they were not constructed. The work of picking up travellers of this class and conveying them

as close as possible to the centre of the cities is the concern of the bus, tram, and underground railways. But, in order to afford the public a choice, the same fares must be charged on all these systems. Now owing to the extremely low fares charged, the passengers are induced, contrary to reason or justice, to select the more uncomfortable train services. The Railway Companies are thus losing millions annually, and are depriving the other services of the returns to which they would normally be entitled, and, by causing their failure to obtain these returns, are also preventing them from paying.

If extremely low fares were really advantageous to those for whom they claim to be advantageous the harm done would not be so serious. This, however, is quite incorrect. The inhabitant of the suburbs has to pay a sum R, for his rent, and an amount F for his fares. If the fares diminish, the landlords raise the rents.

Mr. Le Besnerais, French Northern Railway (in French). — I have to point out that the wording proposed by the reporter gives general information, while Mr. Level's wording applies only to the special case of suburban services.

The President (in French). — But this text is only of interest to France.

Mr. Le Besnerais (in French). — No, all the countries are concerned. It has just been stated that the situation is the same in England.

The finding of the reporter, moreover, is applicable generally to any service.

Mr. Lamalle (in French). — Mr. President, I think I am able to make a much more radical suggestion; it is that we suppress the last paragraph completely.

I know that I shall be met with objections, but I do not think that we can ask the Congress to follow what I may term a definite policy.

Mr. F. Level (in French). — I propose that the meeting be adjourned until to-morrow.

Mr. Direz, *Reporter* (in French). — Mr. Lamalle's opinion is that this question does not interest the Congress. May I be allowed to say that if we are looking for good practice in the various countries, it is advisable that we should also mention what is wrong in some of them, in order that others may avoid falling into the same errors. The economical error that has been made by certain countries in reducing the suburban fares below normal should certainly be mentioned.

The President (in French). — The fact is mentioned in all the reports.

Mr. Direz (in French). — The difference rests in the fact that in England these fares are reduced to one-third of the ordinary fares, while in France, they are reduced to one-tenth : the fares for suburban services are only 1.3 centimes per kilometre, whereas on the main lines, third class fares are 12.5 centimes.

Mr. Moutier (in French). — Gentlemen, I propose to compromise by accepting the wording proposed by the reporter, but to state that it applies particularly to suburban services.

I think that such a statement will be acceptable to Mr. Lamalle who expressed a fear that by leaving it in general terms we might run the risk of going outside the terms of our reference.

The President (in French). — The wording of the proposed resolution is as follows :

« 5. — The fares charged for different

kinds of passenger traffic vary greatly in different countries.

« The principle that each kind of traffic should cover its own direct costs of working is generally accepted in the case of suburban services. »

Our task is not to make recommendations, but merely to state what we find. We have ascertained that certain conditions exist in most of the countries. But it is not within the terms of our reference to throw blame on any particular policy, it rest with you, Gentlemen, and with your respective governments to draw conclusions from our statements.

— This wording was adopted.

— The meeting terminated at 12.40 p. m.

DISCUSSION AT THE GENERAL MEETING

Meeting held on 1 July 1925 (afternoon).

THE RIGHT HON. Sir EVELYN CECIL, VICE-PRESIDENT, IN THE CHAIR.
GENERAL SECRETARIES : Sir HENRY FOWLER and Mr. P. GHILAIN.

Sir Henry Fowler, *General Secretary*, read the final summary adopted by the 3rd section.

This final summary gave rise to no discussion.

The President. — The final summary is therefore as follows :

Final summary.

« 1. — To obtain the maximum output « from suburban services, in the terminal « and intermediate stations, it is necessary to make a close investigation into « all the requirements and possibilities, « an investigation that includes the determining of fixed time-tables for the « times during which trains are standing « at the platforms, for the movements of « the locomotives and the execution of « simultaneous operations at the junctions.

« In order to obtain the maximum use « of the available area in terminal stations a platform should be provided « between each pair of tracks.

« In intermediate and junction stations « island platforms enable a saving in « staff to be effected and facilitate the « passenger changes.

« Special arrangements should be provided in terminal stations in or near « cities for effecting passenger changes « between the suburban trains and the « urban railway system.

« 2. — The adoption of loops allows « the re-dispatching of trains to be « effected with the minimum of interference in the movements of the locomotives and the trains.

« Instances of the application of this « system are, however, not common and « the arrangement for stabling sidings « for locomotives at terminal stations and « of fly-over crossings enables the inter-

« ference in the movements to be reduced.

« Automatic signalling with track cir- « cuits increases the capacity of the line « and facilitates the working; the appli- « cation of this system with luminous « signals having multiple aspects allows « increased capacity to be obtained par- « ticularly on lines that carry various « classes of traffic.

« 3. — Saloon-type stock without com- « partments is preferable for urban lines « on which the passengers make short « journeys only, where the stations are « only about half a mile (800 m.) apart, « and where the provision of large seating « capacity is of less importance.

« The carriages of suburban trains « should afford large transport capacity « per unit of length, and should be fitted « with several doorways of large size.

« When the platform allows, and in the « case of the service to the suburbs near « the city, this method is equally econom- « ical.

« In the case of the outer suburbs, « compartment stock is more usually « adopted because of the greater seating « accommodation it provides.

« 4. — In rush hours, when trains « leave at short intervals, good results « may be obtained both with regard to « economy and overall speed of the trains, « by means of a zone system of stopping « stations, which enables the loads to be « concentrated and distributed to as few « destinations as possible; it is neverthe- « less necessary that stops at sufficiently « short intervals should be made during « rush hours at all stations according to « their importance.

« The most satisfactory service and « that which is most economical for slack « periods is obtained with trains of « shorter length running at regular « intervals and usually stopping at all « stations.

« The use of multiple unit stock in the « case of electric traction gives the maxi- « mum elasticity to suburban services.

« It is desirable that railways should « be authorised to close some stations, in « the neighbourhood of the terminus, of « minor importance where the receipts « are small and the costs of working are « heavy.

« 5. — The fares charged for different « kinds of passenger traffic vary greatly « in different countries.

« The principle that each kind of « traffic should cover its own direct costs « of working is generally accepted in the « case of suburban services. »

— This summary was ratified by the general meeting.

[656 .253 & 656 .256.3]

QUESTION IX.

FIXED SIGNALS.

Fixed signals.

Principles of signalling for lines with dense traffic and for large stations. Form of day and night signals. Signal lights. Automatic block signals.

Preliminary documents.

1st report (America), by Mr. W. H. Elliott. (See English edition of the *Bulletin*, November 1924, p. 907, or separate issue [with red cover] No. 5.)

2nd report (all countries, except America, the British Empire, Italy, Belgium, Holland, Denmark, Norway and Sweden), by Mr. Laigle. (See English edition of the *Bulletin*, February 1925, p. 439, or separate issue [with red cover] No. 20.)

3rd report (British Empire), by Mr. W. J. Thorrowgood. (See English edition of the *Bulletin*, January 1925, p. 79, or separate issue [with red cover] No. 13.)

4th report (Italy, Belgium and Holland), by Mr. C. De Benedetti. (See English edition of the *Bulletin*, May 1925 [2nd part], p. 1937, or separate issue [with red cover] No. 44.)

Special reporter : Mr. C. De Benedetti. (See English edition of the *Bulletin*, July-October, 1925, p. 2161.)

DISCUSSION BY THE SECTIONS

SECTIONS II AND III (MEETING JOINTLY).

Meeting held on 25 June 1925 (morning)

Mr. du CASTEL, president of the 3rd section, in the chair

— The meeting opened at 9.30 a. m.

The President (in French). — Gentlemen, I must apologise for taking the chair at this meeting. I should have preferred that Mr. Weiss, President of the 2nd section should have taken the chair during the discussion on the important question of fixed signals, but he informs me that he is of the opinion that, in accordance with the rules, I should take the chair. Moreover, Mr. Weiss, states that he will have to be absent for part of the morning. I have therefore had to take on this duty against my will.

I have to inform you that there will be no meeting this afternoon, so that the secretariat can finish their notes in time

to be able to be present this evening at the banquet at the Crystal Palace. I therefore ask any members who have any remarks to make to be as brief as possible.

I now call upon Mr. De Benedetti, *Special Reporter*.

Mr. C. De Benedetti then read the summary of his special report.

(This report was published in the July-October 1925 number of the *Railway Congress Bulletin*, p. 2161 and onwards.)

He then proposed that the 2nd and 3rd sections combined should adopt the following suggested clauses :

1. — On lines carrying very heavy mixed traffic, the ordinary home and distant signals, the arms of which can occupy two positions, are no longer found to be sufficient for giving all the readings required to meet the demands of the traffic.

Consequently, if the principle of adopting the new signals cannot be accepted, it should be required that the existing signals, as far as possible, should give three readings or more if necessary; these readings should be definite and easily distinguishable from each other.

While the use of signals of different forms, semaphore or disk, may within certain limits give satisfactory results, the practice of several administrations that have different views, leads us to the view that the semaphore either as a signal for running instruction or for speed, or as an indicator for direction, lends itself best to the ends in view. Using the semaphore with arms capable of taking several positions, it would be possible to increase the capacity of the lines to the maximum, by reducing to a minimum the length of the block sections, and allowing the trains, of whatever type, to run over them at full speed while maintaining the safeguards for safe working.

At junctions and in stations, the semaphores should give the trains all possible information as to route and speed in order that the driver may be warned in time as to which route he will take, and at what speed he can run.

The use of the semaphore having several positions will enable all the flexibility of the permissive block to be obtained while the working of the absolute block is retained, with advantage in regard to safety of working.

The President (in French). — Gentlemen, in agreement with the special reporter, I propose, in connection with the first suggested clause, to open a general discussion on the question of signals, dealing especially with the principle of the insufficiency of two-position signals, as stated by certain countries, although, on the other hand, there are in other countries lines carrying very heavy traffic on which two-position signals appear to give satisfaction.

After this general discussion, we will examine successively the other clauses proposed by the reporter. (*Agreed.*)

I now call upon Mr. Maison.

Mr. Maison, Ministry of Public Works, France (in French). — Gentlemen, as the President has very properly pointed out, the first suggested clause seems to indicate that there are no lines carrying very heavy traffic operated by two-position signals only. This completely overlooks the situation in France, where extremely heavy traffic is carried over lines that have only two-position signals. It is therefore incorrect to say that these signals are recognised as being insufficient for very heavily worked lines. The truth is that these lines can be equally well worked with two-position

signals as with three-position signals. It all depends upon the signalling system and the arrangements adopted.

By this I do not deny that three-position signals may have certain advantages, because I believe that they allow the number of signals necessary to work a dense traffic to be reduced, but to maintain that it is impossible to work a dense traffic with two-position signals is an error which we cannot introduce into our final summary.

Mr. Moutier, Northern Railway, France (in French). — Gentlemen, although I belong to a railway which uses two-position signals, I quite recognise the clear indication given by three-position signals, as this cannot be gainsaid. However, it should also be pointed out that under certain cases the indications given are still insufficient since only three indications can be given. This fact explains the reason why in certain countries, as in Germany for example, semaphore signals are employed in conjunction with disc signals which may give indications which the semaphore is incapable of giving.

This shows that one should not be too definite in expressing an opinion on any particular system of signalling.

Further, I notice that the special reporter, in comparing the efficiency of semaphore signals with disc signals, expresses a clear preference for the former. However, it should be remembered that during the night, only the lights are visible, and the advantages of the semaphore signal completely disappear. We should not therefore attach so great an importance to the shape of the signals as the reporter does. Signals with two lights, such as are used in France, have clearly proved themselves satisfactory both from the point of view of the intensity of traffic and for the speed of the trains.

I now come to the next clause proposed by the reporter :

At junctions and in stations, the semaphores should give the trains all possible information as to route and speed in order that the driver may be warned in time as to which route he will take, and at what speed he can run.

The President (in French). — This is not a conclusion, but an expression of opinion.

Mr. Moutier (in French). — Whatever it is, allow me to say that it is very easy to lay down principles of this nature, but it is on the other hand difficult to carry them out in practice.

Certainly it is desirable to give the engine driver indications concerning the running of a train as regards speed reductions or the route to be taken, which indications may be combined with those given by other signals, but the three-position semaphore can obviously only give three indications, and if it is necessary to give the driver other indications, one must utilise another system.

I therefore think that the wording proposed by the special reporter is not sufficiently broad.

The President (in French). — Perhaps you would put forward the wording which you propose.

Can Mr. De Benedetti give us fuller information on the signalling system used in Italy?

Mr. C. De Benedetti, *Special Reporter* (in French). — In Italy we use the two-position semaphore preceded by a distant signal which has also two positions (« on » and « off »). We realise the need of completing our signalling system

by giving the home signal three positions, indicating « line clear », « proceed at caution » and « stop ».

The President (in French). — You still have then a number of lines on which only two-position signals are employed.

Mr. C. De Benedetti (in French). — Yes, but we realise the need for elaborating our signalling system.

The President (in French). — At the present time, the Italian signalling system consists entirely of disc or semaphore signals having two positions.

The discs are moreover used for secondary lines.

Mr. C. De Benedetti (in French). — This is so.

Mr. Moutier (in French). — I propose to the 2nd and 3rd sections, that if we do not entirely delete this clause, it should be worded as follows : « On lines carrying a considerable amount of mixed traffic, semaphore stop and distant signals, etc... », as this clause means nothing in cases where disc signals are used.

The President (in French). — I think it would be preferable that you should propose a completely different wording.

Mr. Maison (in French). — I regret that I cannot agree with the proposed wording put forward by Mr. Moutier, which seems to suggest that two-position semaphore signals are not sufficient. This would ignore the practice of the Alsace-Lorraine Railways on which they only use two-position signals, and these are sufficient to give all the necessary indications.

Three-position signals have advantages which I am far from denying, since they allow the number of signals to be reduced, but it would be incorrect to say that two-position signals are insufficient, seeing that they are used and give satisfaction on lines carrying very heavy traffic.

On the Alsace-Lorraine Railways they use, at the more important junctions a two-position signal which serves, not only as a stop signal, but also as a block signal. This signal consists of a yellow disc provided with a semaphore arm which gives all the necessary indications. We cannot therefore word the clause to say that a two-position semaphore is unsufficient and should be replaced by a three-position semaphore, although I quite recognise, as I have said before, that the latter has certain advantages.

Mr. Thorrowgood, *Reporter.* — The question before the meeting is that on lines carrying very heavy mixed traffic the ordinary home and distant signals, the arms of which can occupy two positions, are no longer found to be sufficient for giving the reading required to meet the demands of the traffic. It is really an economic question combined with a signalling question, and a question to be considered is whether the two-position system of signalling gives a maximum capacity to the line, that is, gets the maximum number of trains over the line in a given time. If you have to work a line that is scarcely occupied then the two-position signal has something to recommend it; but when you come to places where you want to get a great number of trains over a line you find that two-position signalling does not give that facility. For instance, on the automatic section of signals between Woking and Basingstoke, which is 25 miles in length, in the early days the three-position signal was hardly thought of and the

fourth aspect signal was not thought of at all. It had now been found necessary to have two signal arms with two positions, giving a total of four possible aspects. It really came down to three. You had the home and the distant on; you had the home off and distant on and you had the home and the distant both off. You got those three aspects and those three aspects were found to be necessary so long ago as 1908.

The capacity of the line being determined by the signals, it becomes the duty of everyone — of the signal engineer in particular — to devise some other means by which there can be a greater number of trains on the same section of line in a given time. A three-position signal allows you to do this providing the sections are all the same length; on an underground railway, for instance, or a railway in which you can cut the sections up into mile lengths you could easily arrange for this and you get a very good result from the three-position signalling. But in practice you cannot have those equal divisions of blocks one after the other : one is short and one is long and so on all the way along. Then a three-position signal does not cover the requirements at all and you require another aspect, as we English call it. We have a four-aspect signal. For instance, take Station A and a station five miles away, that is in the ordinary signalling working you have a starter and an advanced starter, and the train has to go perhaps four miles before it comes to the next station. With a three-position system of signalling you would have to give the man at the starting signal a caution signal though the station was four miles away; that is to say, the driver of that train would have had a caution signal and according to the rules would have to go slowly for that four miles, which of course is not at all increasing the capacity of the line. Therefore, another aspect is required to give the man permission to travel at full speed during that four miles and to let him come up to a fourth aspect in entering the next section. I wish to make a statement at the end of the discussion and to show you a model of what we are going to do, so that I will not discuss this now.

The end of all signalling should be to give the driver a simple indication of the intention you wish to convey to him, as to whether the road is clear or not. If you have a two-position signal you find in practice that those two positions are multiplied when it is necessary to give another direction, such as speed. You get not one semaphore giving one or two positions, but you get three or four, or more at a diverging junction, and in some cases I have noticed as many as 18 different aspects on one signal post at a diverging junction, that a driver has to know and obey. The idea of having four aspects is to have four aspects only or three aspects only if the conditions allow, but no combination; so that the signalling is reduced to a very simple system and no driver can mistake it.

As regards the junction, I agree that it is necessary to give the driver every information at a junction to show which way he is going — whether to the left or to the right. But I am inclined to think that if you give him a semaphore arm and a number which tells him the speed at which he is to go and then give him another indicator to show the route that he is going — that is three different signals altogether — you begin to complicate matters. Therefore, if you can bring the junction into line with the four-aspect signals and have one aspect for

one definite meaning, and each aspect has the same definite meaning always, you will find that by giving him a route indicator at the top of the signal — a greatly illuminated one that he can see perhaps a quarter of a mile away — that is all that would be necessary.

Mr. Maison (in French). — I wish to say just a few words, Gentlemen, in support of the remarks made by Mr. Thorrowgood.

I believe, in fact, that the three-position signals allow the number of signals to be reduced, but subject to the condition that the block sections are very short and do not exceed 1 500 or 2 000 m. (1 600 or 2 200 yards) as a maximum, otherwise one would have to run at a reduced speed over a distance of several kilometres, or it is to be feared that the driver would not reduce his speed before reaching the next section, so that when the sections are long, one is obliged, as I believe is the case in America, to supplement the starting signal with another signal which gives two indications « line clear » and « reduce speed », so that a three-position signal becomes a two-position signal.

The conclusion which it appears to me should be arrived at as a result of this discussion is, that it would be better to delete this clause. I propose that it should be deleted.

Mr. Pellarin, Eastern Railway, France (in French). — Gentlemen, I believe that we should be wrong to consider the question of the use of three-position signals from the point of view of operating heavy traffic. There are in existence lines with a very heavy traffic up to 20 trains per hour which have only two-position signals. I think that the question should be dealt with solely from the point of view of the reduction in the number of aspects given to the driver.

In practice, when the traffic is of considerable volume, one has to decrease the length of the block sections and to have a two-position signal giving « stop » and « line clear » indications, and a distant signal which also as a rule has two indications : « danger » and « line clear ». When both signals are in the « off » position, one of these is useless, since there is no point in repeating the indication given by the other, and the driver has to notice two indications where one alone would be sufficient.

It appears then that the advantage of the three-position signal is that it reduces the number of indications given to the driver and only gives him the most important indication. I propose therefore that we say :

« On lines carrying very heavy traffic, it may be advantageous to replace two-position signals by three-position signals which allow the number of indications given to the driver to be reduced and only display the most important indication. »

The President (in French). — We have therefore two proposals, that of Mr. Maison, who would like to delete this clause, and that of Mr. Pellarin, who proposes a new wording.

As Mr. Pellarin's proposal makes a suggestion which has not been put forward by the reporter, I propose, with his approval and with that of the President of the 2nd section, to close the discussion on the first suggestion, which can be decided upon after we have discussed the other suggestions contained in the report. (*Agreed.*)

Mr. Maison (in French). — Certainly.

The President (in French). — That is agreed to then.

I would ask Mr. De Benedetti to read the second clause which he proposes.

Mr. C. De Benedetti, *Special Reporter* (in French). — I have to propose the following clause :

2. — The semaphore arm capable of taking positions in the lower and upper quadrants, preferably the upper, should give the three readings : stop, reduce speed, line clear. The other readings relating to speed should be given by the combination of two arms taking three positions. The readings giving the route should be given wherever possible by means of bracket semaphores.

Mr. Moutier (in French). — In this second clause, it is said that the various aspects can be given by the positions of the arms or by the combination of two three-position arms. However, we should not overlook the use of luminous signals which allow the number of signals to be reduced and which may be interlocked with the points.

The President (in French). — What text do you propose?

Mr. Moutier (in French). — I have not had time to prepare an alternative wording, if you wish I will have one ready shortly.

Mr. Pellarin (in French). — Would it not be simpler to confine ourselves to saying that the movable arm should give three indications? We could delete the last two sentences commencing with « The other readings... »

Mr. Maison (in French). — We might say : « The other readings as regards speed *may be* given... », instead of « *should be* given ».

As regards the last sentence; « The readings giving the route should be, wherever possible, by means of bracket semaphores », this I think shoud be deleted, because there are in existence, especially on the Northern Railway of France, combinations of semaphore signals and luminous signals which work perfectly well and give route indications in a very clear manner.

Mr. Thorrowgood. — This proposition, as put, shows that you cannot do with two positions on one arm only. As a matter of fact they propose to use three and then in certain cases to use a second arm with another three so that you have six indications. Under the system which has been proposed by the Institution of Railway Signal Engineers of England, every condition is met by four aspects and sometimes only three are required. It shows a clear section there is no reason speed ». The speed of the train is certainly the driver's proposition and it is his duty to attend to that. If the signal shows a clear section there is no reason why the driver should not run at the highest speed he can. Therefore, the English Institution of Signal Engineers have given up the idea of having speed signals at all. If the line is clear the driver can go at what speed he likes unless he has a cautionary signal to go slow. If you think of giving a driver the speed at which he is to go there will be no end to the number of indications that you will have to provide. When a driver has one indication he sees it and picks it up immediately, but if you give him 12 — one here and there — there is always the risk of his mistaking that signal or forgetting it a little while after he has passed it. Therefore, the English Institution of Railway Signal Engineers have rather come down to one aspect with a definite meaning to the driver, to tell him definitely whether the road is clear ahead, or whether he has to go with cau-

tion, or whether he has to stop at the next signal.

Mr. Moutier (in French). — What Mr. Thorrowgood has just said is extremely interesting, and he has arrived at the same conclusion as we have, although by a different process of reasoning. It is therefore wrong to say « the other readings relating to speed should be given... » since the English reporter has just pointed out that the combinations give six indications which it is difficult to recognise and act upon. The driver will be put to very great trouble to remember the meaning of the signals. It appears to me preferable to only give him one signal, and it is for this reason that the English reporter has proposed a four-position signal system so as to give one indication which will give rise to no confusion. Therefore, I think we should state in our final summary « the other readings relating to speed may be given... » The clause as thus modified would, moreover, conform with the idea put forward by Mr. Maison; only to have one signal combined with a supplementary indication which would give additional information to the driver.

The President (in French). — I would point out to Mr. Moutier that Mr. Thorrowgood also objects to the principle contained in the first sentence of this clause « The semaphore arm capable of taking positions in the lower and upper quadrants, preferably the upper, should give the three readings : stop, reduce speed, line clear. » He wishes to delete the « reduce speed », as drivers should not be instructed to reduce speed; it is sufficient that they should be warned of any obstacle in front of them and the speed should be left to their judgment.

Mr. Moutier (in French). — I was only dealing with the second part of this clause, and I propose to replace the word « should » by the word « could ».

Mr. Maison (in French). — It does not appear to me that it would be possible to do away with the « reduce speed » indication. It is immaterial that there is no hard and fast rule laid down as to what the reduction of speed should be, but it is absolutely indispensable that the signal should give three indications, and that the reduce speed indication should have the meaning which is given to it in the rules.

We could not merely inform drivers that there is nothing in the way, because there are cases where they are obliged to reduce speed, especially when passing over facing points or turning into a branch line.

I propose that we retain the wording put forward by the special reporter, except as regards the second line.

Mr. Thorrowgood. — I would ask that instead of « reduce speed », the words « proceed with caution » should be used.

The President (in French). — We might perhaps adopt the word « avertissement ».

Mr. Wasiutynski, Polish State Railways (in French). — That is a very good translation of the English word « caution ».

The President (in French). — We might also delete the third sentence of this clause.

Mr. Wasiutynski (in French). — I think that we might also delete the words « preferably the upper », because this implies that one of the positions of the arm should be the vertical position. Instead of this position, which is

not sufficiently clear, a position of the arm in the lower quadrant is much to be preferred, and for this reason it is better not to give any definite opinion as regards the quadrant to be adopted.

The President (in French). — If we are to follow this suggestion, we should delete not only the word « preferably », bult alsa the words « in the lower and upper quadrants ». I propose that we should only retain the following wording: « In three-position signals, the arm should give the three following readings : stop, caution and line clear. »

Mr. Wasiutynski (in French). — I quite agree.

Mr. C. De Benedetti, *Special Reporter* (in French). — The next clause is as follows :

3. — The most suitable lights that correspond to the three positions of the signal arm should be as follows : red (stop), yellow (reduce speed), green (line clear).

It is desirable that a white light should only be used for readings of a subsidiary nature.

Rational combinations of three coloured lights should correspond with the combinations of two signal arms. It is advisable to avoid, where several arms are used, the simultaneous existence of a line clear light in conjunction with red lights.

Mr. Maison (in French). — We have already decided to change « reduce speed » to « caution » in clauses 2 and 3, but both indications are necessary; there are cases where it is necessary to reduce speed.

The President (in French). — It is to be understood that caution may also imply reduce speed.

— Clause 3 was adopted with the replacement of the term « reduce speed » by « caution ».

Mr. C. De Benedetti (in French) :

4. — It is desirable that shunting operations inside railway stations should be controlled by small arms capable of taking three positions, with violet, yellow and green lights at night. Steps should be taken for the progressive elimination of signals of other forms at present in use.

It is good practice for the official in charge of the traffic service to control the various successive cabins in a station so as to regulate the arrival of the trains over the groups of tracks and on the platform tracks.

In stations, the application of all the improvements that have been sanctioned by experience should be extended, such as the operation of points and signals by fluid transmission; the interlocking of the various cabins with each other; the installation of track circuits; the fitting of luminous diagrams, etc.

Mr. Pellarin (in French). — I think the wording of the first sentence is too strong, seeing that I do not agree that it is absolutely necessary to gradually replace the various forms of signals now in use.

Mr. Le Besnerais, Northern Railway, France (in French). — I propose that we completely delete clause 4. This question is too complicated a one for any uniform method to be adopted. There are, moreover, practices arising from special local conditions which it would be very dangerous to change, and upon which the rapidity and safety of shunting operations depend.

Mr. Wasiutynski (in French). — I support the proposal which has just been put forward from the point of view of safety. I consider that in practice it

is dangerous to adopt for shunting purposes signals which resemble those protecting trains. It would be a mistake to recommend semaphore signals for shunting purposes.

Mr. Thorrowgood. — The English practice is, when permission is given to pass a shunting signal, that it is only a signal to the next signal, so that we find it necessary to have two colours only, namely, red for « Stop » and green for « Proceed », which means to proceed to the next signal only, and gives no information. In a big yard there is something to be said for three-light signals, but, as I say, in practice we do not follow it out. The difficulty with the red light for a shunt signal is that a driver has to pass a « Stop » signal, although it is on the ground, and it has been the aim of English signal engineers, and American signal engineers as well, I think, to prevent a driver having to pass a « Stop » signal in any case. What we do in some signalling that I am engaged on now is to arrange that the shunt signal on the ground must be pulled off as well as the running signal into the station.

Mr. Moutier (in French). — I agree with what Mr. Le Besnerais has just said, but there is one thing which he does not mention, that is, that on certain railways there are no shunting signals within stations. For this reason I propose the following wording :

« It is desirable that in stations where shunting operations are controlled by small semaphore signals, that these should have two or three positions. »

The President (in French). — The following is the wording proposed by Messrs. Moutier and Thorrowgood :

« It is desirable that within stations where shunting operations are controlled by semaphore signals, that these should have two or three positions. »

The reference to the colour of the lights would be deleted.

Mr. Moutier (in French). — This shows that it would be still better to delete the whole clause. For shunting signals inside stations, the greatest latitude is left to the railways. It is always necessary to take into account local difficulties. It is not possible to recommend a uniform system for all the stations on any line, let alone for all the railways and for all countries.

Mr. Pellarin (in French). — I think that the conclusions to be drawn from this discussion is that where there are semaphore signals, these should have several positions, but it would be better not to mention this at all.

The President (in French). — Mr. Thorrowgood and the special reporter have agreed to the deletion of this clause.

— Clause 4 was deleted.

Mr. C. De Benedetti, *Special Reporter* (in French) :

5. — When signals, even though placed in suitably chosen places, do not have the necessary visibility, as in the case of provision against fog, the approach to them should be announced by definite marks such as white boards or diagonal stripes on the posts before the signals, so that the installation of a second warning by acoustic signals, fog signals or luminous repeating signals, may be avoided as far as possible.

I propose, Gentlemen, to modify this wording as follows :

« Whatever method of signalling is adopted, when the warning signals... etc. »

Mr. Renard, Eastern Railway, France

(in French). — I think it would be better to delete the words « provision against fog », because if the posts are painted or white boards are erected, these will be permanently in position and not only there during foggy weather.

The President (in French). — That is no doubt an error.

Mr. Thorrowgood. — One advantage of the four-aspect luminous signal is that it can be seen in the daytime and at night as well. We think that it is quite possible that that will be so. We hope that the light signal will be so brilliant that it will be seen in fog very nearly the same as at the present moment. In an installation which we now have in hand we are proposing to try that, and to work with that idea, but in starting it we propose to have an ordinary fog-man with a detonator to explode in case of a caution being necessary.

With a four-aspect daylight signal we propose to do without the fog-man, but we are going to try beforehand to see whether we can do so or not. With regard to the board that has been suggested on the Metropolitan and on the District Railways in the open, where they are subjected to fog at times, they have a luminous repeater which repeats the signal 100 yards back aligned with the driver's line of sight, so that when he comes to the signal he has seen the red or yellow or green light repeating the signal in front, and it gives him confidence in running.

The President (in French). — We are going to deal with the question of luminous signals presently, as they are mentioned in a special clause.

I think therefore, in view of Mr. Thorrowgood's remark, that in bright daylight the white boards have not given results which have come up to expectations, that this clause might be modified as follows :

« Whatever method of signalling is, adopted, when the signals although they may be erected at well chosen spots, are not sufficiently visible, it is advisable to give warning of their nearness by means of repeating devices... », etc.

Mr. Maison (in French). — If I correctly understand the reporter's meaning, it is that where certain signals are situated in localities where fogs are frequent it is sufficient, provided that their visibility in normal weather is sufficiently good to mark their approach by white boards or other indicators.

We might therefore say :

« When signals are situated in positions where fog frequently occurs... », etc.

In England, and also in France, there are localities where the signals are perfectly visible in clear weather, but where fog frequently occurs. It would therefore be advisable to take the precautions recommended by the reporter.

The President (in French). — Does anyone else wish to speak on the wording of this clause?

Mr. Hachon, Paris-Lyons-Mediterranean Railway (in French). — In the first wording proposed by the reporter, it was a question of three-position signals. This wording has been modified to read « whatever method of signalling is adopted » and it now recommended that all signals should be preceded by special warning posts, although it would appear that these are only necessary for distant signals. It would appear preferable to me that we should therefore modify the text as follows : « Whatever method of

signalling is adopted, when distant signals, although... ».

Mr. Thorrowgood. — I would suggest that it should read : « Should be announced by definite luminous marks », and that the board, instead of being striped, should be lighted so that the driver could see it.

The President (in French). — I think that would be too costly.

Mr. Thorrowgood. — It would be expensive on railways with light traffic, but on railways with dense traffic it is a necessity, and the expense has to be faced.

The President (in French). — We are dealing from a general point of view, and the case quoted by Mr. Thorrowgood is rather a special case.

We will now pass to the consideration of clause No. 6.

Mr. C. De Benedetti (in French). — This clause is as follows :

6. — Where electric energy is available, its use should be substituted gradually for the mineral oil lamps almost universally in use, preferably by the system using lamps with parallel filaments at the focus, and comprising for each main signal one lamp lighted and another as stand-by, with an indicator showing extinction of each lamp and provision for the automatic lighting of the stand-by lamp.

In some places, lighting by dissolved acetylene with blinking lights might be adopted; it is to be recommended especially where it is necessary to distinguish one signal from the others.

Mr. Thorrowgood. — I think, instead of saying two lamps should be used, that one lamp with a double filament should be used, one filament to be the main filament and the second filament to be the stand-by filament. The stand-by filament should have a luminosity or candle power about 40 % lower than the standard filament. Even if two lamps are used, the stand-by lamps should have not more than about, say, 50 % of the candle power of the main lamp.

The President (in French). — I think that the wording of this clause does not give sufficient latitude. The word « should » might be altered to « it is desirable ».

Mr. Wasiutynski (in French). — We might say « it is recommended ».

The President (in French). — Or better still « it may be advantageous ».

In order to keep in line with the suggestions put forward by Mr. Thorrowgood, one could in this case, where electric lighting is substituted for the existing methods of lighting, retain the principle of « stand-by » lamps.

Mr. Hachon (in French). — This question does not appear to me to be yet quite satisfactory. The method recommended by the special reporter appears to me to have too little latitude for it to be applied. Certain systems may be of importance at the present time which will no longer be used in the future.

The reporter also mentions sources of electric supply. I would point out to him that some sources of electric supply are unsuitable for signal lamps.

I consider therefore that it would be preferable to leave this to the railways who are no doubt closely following the progress which is being realised in this respect, and to delete entirely the clause proposed by the reporter.

Mr. Renevey, Alsace-Lorraine Railways (in French). — The following wording might be adopted : « Where a supply of

electric energy is available, it is advantageous to light signal lamps electrically provided that full precautions are taken to overcome the danger of their being extinguished. »

The President (in French). — It appears to me absolutely necessary where signal lamps are electrically lighted that there should be a suitable tell-tale and a stand-by lamp. The following is a new wording which I think can be accepted by all the members of the 2nd and 3rd sections : « The technical measures should be such that in case of the extinction of a lamp, a stand-by lamp should be brought into use and eventually a tell-tale system. »

Mr. Thorrowgood. — Can you make that a stand-by lamp or a double filament lamp?

The President (in French). — It is so worded that it does not matter, so long as there is a stand-by.

Mr. Thorrowgood. — In that case I should suggest that the stand-by lamp should be of a candle power 50 % less than that of the main lamp.

The President (in French). — I consider we should not enter into details as to the method, but simply propose the principle.

Mr. Thorrowgood. — If you have a main lamp and that lamp gives 100 candle power, say, the drivers get used to that 100 candle power lamp. If the stand-by lamp is the same candle power as the main lamp, namely, 100 candle power, when the first light goes out the second light comes on, and the driver sees no distinction at all. You are then in the position of having only one light and you have no stand-by at all; whereas, if you have a light that is less in brilliancy to the extent of 50 % the driver immediately sees it, and he reports it to the signalman at the other end, and the lamp is attended to quickly.

The President (in French). — We should also consider the case where it is not a question of the extinction of a lamp, but of a failure in the leads. In this case the stand-by lamp will not light and there should be a tell-tale system which gives warning of this.

Mr. Moutier (in French). — I should ask, however, that the words « eventually a tell-tale system » should be deleted.

A delegate. — There is no stand-by lamp in the case of oil illumination. I do not therefore see the necessity, where electric lighting is substituted, for the provision of a stand-by lamp.

Mr. Moutier (in French). — In matters such as this there is generally a tendency to extend the requirements. However, as a rule, the more one simplifies the required conditions, the quicker one arrives at a satisfactory solution.

The President (in French). — If we are going to apply electric lighting to signals, we should try to improve upon existing conditions. The provision of stand-by lights and tell-tale devices is already in use on ships, and it is obviously desirable to extend it to railway signals. This clause, moreover, is not too rigidly worded.

Mr. Wasiutynski (in French). — We could add the words « wherever possible ».

Mr. Epinay, Paris-Orleans Railway (in French). — For my part I support Mr. Moutier's proposal. If in the case of the substitution of electric lighting for

oil lighting we are obliged to instal a complete system of stand-by lamps and a tell-tale apparatus for all signals, we should have a very costly installation. In many cases it would therefore be necessary to abandon electric lighting, which on a simpler basis might make considerable progress as a substitute for oil lamps.

Mr. Moutier (in French). — An additional feature has sometimes the disadvantage of rendering the apparatus less reliable in its operation. On paper it may appear to be better and more complete, but in practice it may present serious difficulties in its working. The simpler one makes the conditions required from a safety device, the more likely is it to work satisfactorily.

Mr. Maison (in French). — It would be interesting to know if there are at the present time any railways using electric signals which are provided with a tell-tale system.

Mr. Cambournac, Northern Railway, France (in French). — There are such in existence, but they are very expensive.

Mr. Maison (in French). — Under these circumstances we may adopt the text proposed by the President, with the addition of the word « eventually ». This clause will therefore merely be a statement of facts.

Mr. Thorrowgood. — I think it is really imperative to have a stand-by lamp, more especially in cases where they are going to have luminous signals pure and simple. Even in the case of ordinary signals it is not to be thought of that, say, in regard to a distant signal, which is the first signal that a driver approaches, that light should be out altogether, if it is possible to prevent it. We know with oil lamps that although they may burn low, they do not go out altogether, but with electric light, after a certain time, the filaments are liable to break. The consequence is that you must have a stand-by or something to fall back on. Certainly the supply may fail, but you do not lay yourselves out on that, because that is supposed to be continuous and you cannot provide against it altogether. But you can provide a stand-by, and it seems to me that in any luminous signal that is put on the market or put into use it will be imperative that you should have a stand-by signal to give a diminished light to the driver, so that the driver can tell the signalman at the next station that there is something the matter with the lamp.

The President (in French). — We must confine ourselves to putting forward recommendations and not lay down any hard and fast rules. The following is the final wording which I propose :

« If suitable current is available, it might be advisable to substitute electric lighting gradually for the mineral oil lamps almost universally in use; the technical measures on the systems which have adopted this method of lighting are in general that in case of the lamp being extinguished, a stand-by and as far as possible a system of control shall be in operation. » (*Approved.*)

Mr. C. De Benedetti, *Special Reporter* (in French) :

7. — Luminous signals having been brought to such a state of perfection as to give great efficiency and a great measure of safety, their use is to be recommended for areas in which electric supply is available, and particularly for use on lines worked by electric traction, in tunnels, in large stations, and on approaching stations.

Mr. Hachon (in French). — I should like to delete the words « and particularly for use on lines worked by electric traction », because it would be very difficult to use for signal lamps the current used for working the trains. If it were necessary to provide a small transformer at each signal, it would be very complicated and expensive.

Mr. Moutier (in French). — Instead of saying « their use is to be recommended », I propose to say « it is recommended that the use should be considered. »

Mr. Thorrowgood. — Since I wrote this report, the Southern Railway, to which I am attached, has given instructions for a four-aspect system of signalling to be introduced on the lines between Holborn and Elephant and Castle, between Charing Cross and London Bridge and between Cannon Street and London Bridge. It seems to me it would be interesting to the delegates to see what is suggested. It is proposed to have signals with four aspects. The « stop » is represented by red; « Proceed prepared to stop at the next signal » is represented by a single yellow; « Proceed, next signal in caution position » is represented by a double yellow, and green indicates « Line clear ». The route indicator where it is necessary will be the same size as the lamps. It gives the number of the platform or anything else you want to convey. This system is being put in use now and will be in use in the middle of August on the Southern Railway.

Mr. Maison (in French). — In France, signals of this kind have been used on the State Railways.

The President (in French). — Mr. Thorrowgood will give us some further information as regards these signals after the meeting.

As certain members have mentioned the difficulty in installing such signals, I think that we should discuss them because they are interesting, but we cannot say that we recommend them, that would be too definite.

Mr. Moutier (in French). — I propose to say « it is to be recommended that their use should be considered ».

Mr. Maison (in French). — It is the coming system.

The President (in French). — Perhaps so; but if the line current is fairly high, it would be necessary to provide transformers, and that would be extremely costly.

Mr. Maison (in French). — We might say that it may be advantageous to use signals of this kind. It would depend upon circumstances.

Mr. Direz, French State Railways (in French). — Gentlemen, I think that the railways which have not experimented with luminous signals and which have not seen them in operation are rather dubious on this subject. However, the experience which has been gained on a large scale by the French State Railways on lines carrying a very heavy traffic has shown the excellency of the system.

As regards the question of cost, that is hardly within the scope of the present discussion. Moreover, from this point of view, luminous signals or disc signals are on an equal footing.

Mr. Thorrowgood. — I have studied the question of luminous signals for several years, and the fact that they are being introduced on the Southern Railway, on which railway I am in charge of

the signals, shows that I have a certain amount of confidence in them. The luminous signals we are using on the Southern Railway will be lighted by a special signal current — an alternating current of 75 cycles, supplied to us at 220 volts — at nearly all the places on the electrified area. I agree in the suggestion that the system should be confined to places where an electric supply is available. Although it costs something more for electric light energy than it does for oil lamps, the system altogether of using luminous signals such as is described here for both day and night indication is so economical that when you come to look into it all mechanical signalling is thrown out of the question altogether. For instance, there are no moving parts with a light signal; and there are no rods or signal wires along the line. The consequence of that is that the lines are free for the men to walk on, and you save any amount of trunking and covering so as to prevent men from falling over the wires. Further, there is no indefiniteness about a light signal, because a light signal is either alight or it is out; whereas, with a semaphore arm, sometimes it may be drooping just a little, so that a driver cannot say whether it is « on » or « off »; or possibly it may be a little bit cocked up. Further, the light signal system lends itself to easier maintenance. The men have not to go round and adjust the signal arms and they have not to tighten a wire, or what not. Everything as you put it in practically remains the same for years, and requires no maintenance at all.

The President (in French). — Gentlemen, to resume the discussion, I propose that we say :

« Sections 2 and 3 combined have noted the progress made in luminous signals and also the safety arising from their use. They are of the opinion that it is desirable to consider their use in sections where there is a supply of electric energy, especially for lines worked by electric traction. »

Mr. Hachon (in French). — In clause No. 6 it says « if one has a suitable source of electric energy ». I think that that wording might be repeated here.

The President (in French). — I agree.

Mr. Thorrowgood. — I will just mention one thing I left out, and that is with regard to the four-aspect signals and with regard to simplicity and getting rid of colours. What we have arranged on the Southern Railway is to have three colours only : Red for « Stop » — and that will always be « Stop »; — yellow for « Caution » and green for « Clear ». Therefore there is no mixing up of the « Clear » and the « Caution » and no mixing up of the « Danger » and the « Caution ». The three are kept quite distinct : Red « Stop »; green « Clear »; yellow « Caution » in all cases.

The President (in French). — Before proceeding to clause No. 8, I should like to thank Mr. Thorrowgood for the interesting explanations which he has kindly given us on the question of the luminous signals which have been adopted on his railway. We also thank him in anticipation for the information which he will give us after the meeting. (*Hear, hear.*)

Mr. C. De Benedetti, *Special Reporter* (in French) :

8. — The gradual introduction of the automatical block-system so far as local conditions permit, on the particular system which is most suitable, combined in

some places with luminous signals, is to be recommended.

The President (in French). — As nobody wishes to speak upon this clause, I propose that we resume the discussion on clause No. 3 dealing with coloured lights.

Mr. Thorrowgood. — In paragraph 3 it was recommended that three aspects should be used, and we have already discussed some of the points since in connection with other matters, but I wanted to deal with the question of a fourth aspect. I suggest that we should have red for « Stop »; green for « Clear »; one yellow for « Stop at the next signal »; and two yellows for a caution signal, so as to keep the red for « Stop » absolutely; green for « Clear » and yellow for « Caution ». There can then be no mix up of the colours in the driver's vision, because they are all kept separate. If he sees a yellow, whether it is a single or a double yellow, he knows it is a caution signal and not a « Clear » or a « Stop ». I should like that fourth aspect to be added to the resolution.

The President (in French). — What you suggest applies more to clause No. 1 which has not yet been decided upon.

We are here dealing with one proposal to delete the clause, and another proposal to modify the wording.

Mr. Moutier (in French). — It is preferable to delete this clause.

The President (in French). — If some of the delegates consider that the two-position signals are not sufficient, others consider that the three-position signals are also insufficient. I think therefore that we should confine ourselves to saying, that on lines carrying very heavy traffic, it has become necessary to considerably increase the number of signals which a driver has to observe, and with this object, tests are being undertaken on various systems in certain countries.

Mr. Moutier (in French). — It is better to simply delete this clause.

The President (in French). — Contrary to what certain delegates may think, I believe that it is not necessary to unify the signal systems used in the different countries. In practice, drivers of any one country do not run over lines belonging to other countries. I might also point out that when English drivers were employed in France during the war, they very quickly became used to the different signal system. In the case of intelligent men, they adapt themselves without any difficulty to the signals and rules of the country in which they happen to be. (*Applause.*)

We might therefore, as some of the delegates propose, merely delete clause No. 1.

We might, however, express the following opinion :

« In view of the requirements of the dense traffic on heavily worked lines; in view of the differences in practice in the various countries, and in view of the various experiments carried out in these countries, it would be desirable that this question should again be placed on the agenda for the next Congress, so that note might be taken of the progress made and so that all might profit from the results obtained in connection with this subject. »

Mr. Thorrowgood. — I think No. 1 should stand because it is a fact that the two-position signal does not meet the demand of the traffic now, even in France.

Mr. Wasiutynski (in French). — I think it is desirable that clause No. 1 should stand, and that the proposed resolution

put forward by the President should be completed as follows : « on certain heavily worked lines, it is recognised that two-position signals are not always sufficient. Some railways consider, however, that this system of signalling is sufficient, even for fairly heavy traffic. For this reason the sections express the opinion that the question should be again brought up at the next session. »

I think the fact which has been brought forward that certain railways find two-position signals sufficient, even on heavily worked lines, is very interesting.

The President (in French). — In the report of this meeting we shall state that the discussion has shown that certain countries are able to work a heavy traffic over their lines with two-position signals; others prefer three-position signals, while others, however, consider that a fourth aspect is necessary. Under these conditions, the sections consider that there is reason to continue investigations and tests in accordance with the principles proposed by each railway, and that it would be of interest to again place this question on the agenda for the next Congress, so that each country may be able to profit by the experience and results acquired during the five years which will elapse.

Mr. Direz (in French). — It appears from the text of the report put forward by the special reporter that there is a certain confusion in his mind between the absolute block and the permissive block used in France. I think that this arises merely from the confusion of the words : for what we call permissive block in France is known, I believe, in other countries as absolute block.

We call the absolute block the case in which, where for any reason the signal cannot be in the « off » position, a train must stop until a definite instruction is given that the line is clear. On the French State Railways we even require in such cases a special inspection on foot of the block section. What is called, on the other hand, absolute block in other countries is, I suppose, a block system in which if the line is not clear the train must stop, but may then proceed without having a definite instruction that the line is clear. With the automatic block one cannot stipulate that whenever the signal apparatus is out of order one must make an inspection on foot over the section, which may be as long as 4 km. (2 1/2 miles).

Mr. Thorrowgood. — No; the absolute block in England means that there must be a section ahead clear before any train can go into it. A permissive block is at a goods yard siding, or something of that kind, where trains go into a terminal station. It is permitted for one train to go on and then a second can go in, and so on. Our friend, I think, is confused in this way; if you have an automatic signalled line and there are no signalmen and the signal was on through some fault or another, the train would stop there all day. Therefore, the instructions are that if say a train stops at Fleet on the automatic between Woking and Basingstoke by signal for three minutes, then the driver is allowed to go on cautiously to the next signal whether the line is clear or not.

The President (in French). — There is, it appears, a difference in the meaning of these terms, but I think this will be made clear in the report of the meeting.

— The meeting terminated at 12.45 p. m.

DISCUSSION AT THE GENERAL MEETING

Meeting held on 27 June 19? (morning).

THE RIGHT HON. VISCOUNT CHURCHILL, PRESIDENT, IN THE CHAIR.

GENERAL SECRETARIES : Sir HENRY FOWLER and Mr. P. GHILAIN.

Sir Henry Fowler, *General Secretary*, read the final summary adopted by the 2nd and 3rd sections meeting jointly.

The final summary gave rise to no comments.

The President. — The following is the final summary :

Final summary.

« 1. — The Congress notes that certain « administrations operate lines with « heavy traffic and with mixed traffic by « using only « Stop » and « Caution » « signals with two positions. Others « prefer three-position semaphores and « yet others consider a fourth position « indispensable.

« In these circumstances the Congress « considers that signalling systems should « be further examined and experimented « with in accordance with the ideas of « each line, and that it would be advisable « to put this question on the Agenda for « the next Congress, so that each country « may profit by the experience and the « results which will be obtained during « the coming five years.

« 2. — When three-position signals « are used, the movable arms should give « the three following indications: « Stop », « « Caution » and « Clear ». Other indi- « cations as to speed may be given by « the relative positions of two three-po- « sition arms.

« 3. — The most suitable lights cor- « responding with the three positions of « the arm are red for « Stop », yellow for « « Caution » and green for « All clear ».

« 4. — Whatever method of signalling « is adopted, when the warning signals, « although they may be erected at well- « chosen spots, are not sufficiently « visible or are placed in neighbourhoods « exposed to the possibility of fog, it is « advisable to give warning of their « nearness by using definite marks such « as white boards or diagonal stripes « on the posts before the signals, etc., so « that the installation of a second warn- « ing by acoustic signals, fog signals, or « luminous repeating signals, may be « avoided as far as possible.

« 5. — If suitable current is available, « it might be advisable to substitute « electric lighting gradually for the « mineral oil lamps almost universally in « use; the technical measures on the

« systems which have adopted this method « of lighting are in general, that in case « of the lamp being extinguished, a « stand-by and as far as possible a system « of control shall be in operation.

« 6. — The Congress notes the pro- « gress made in the application of « luminous signals, and also the conve- « nience and safety obtained by their use. « It is of the opinion that it is advisable « that their use should be considered and « investigated in those districts where « suitable electric power is obtainable, « more especially on the lines having « electric traction.

« 7. — The gradual application of the « automatic block, compatible with local « conditions, utilising the system which « is most suitable, combined in certain « places with luminous signals, is recom- « mended. »

— The General Meeting ratified this final summary.